Contractors and Engineers Monthly

7TH TIER

JUNE, 1932
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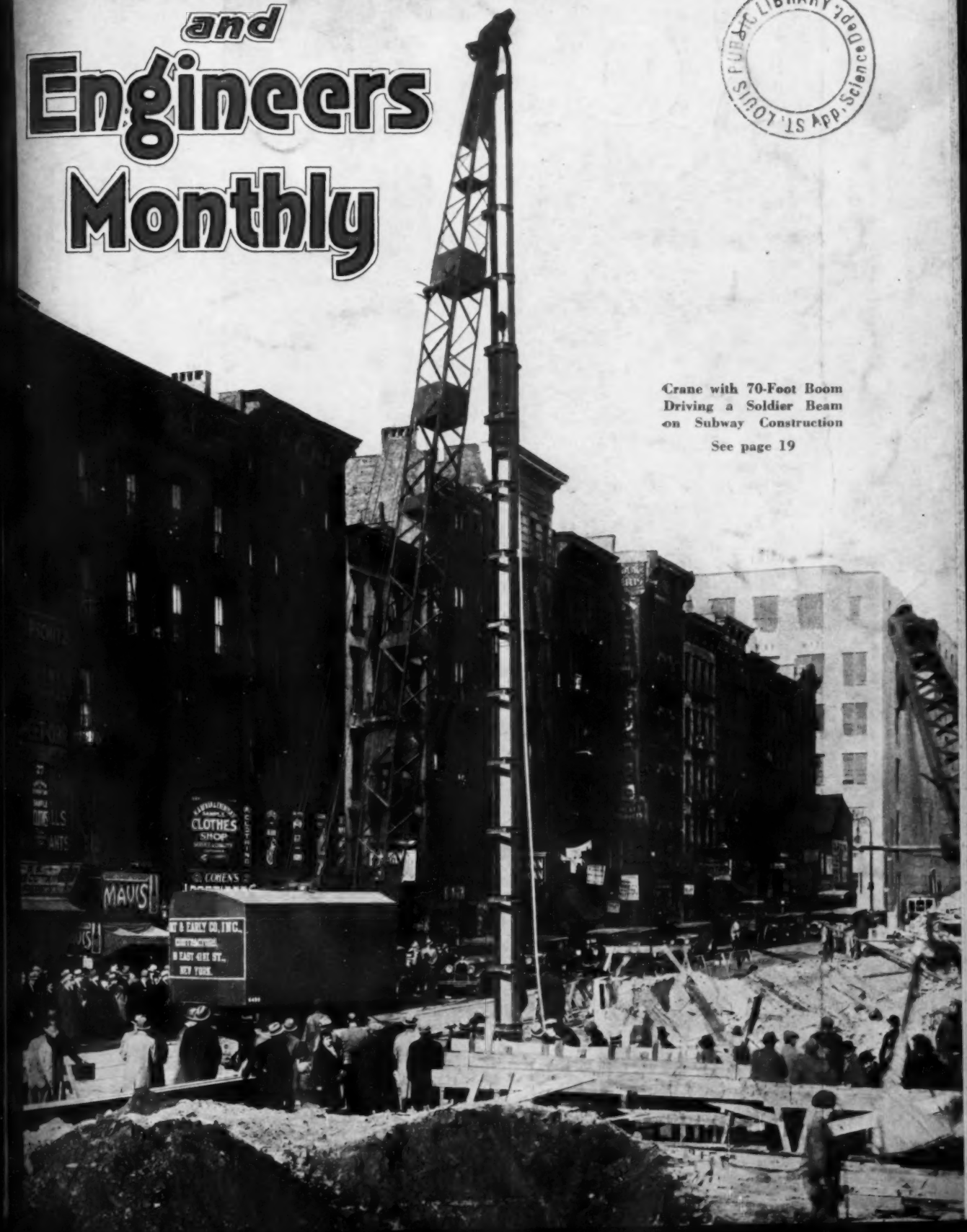


Crane with 70-Foot Boom Driving a Soldier Beam on Subway Construction

See page 19

In Rough Country

Paver Poured Long Culvert

Loesch & Green Construction Co.

Standardized Forms

to Reduce Costs

of Labor

and Lumber

ONE of the largest projects for grading and draining that has been let in recent years in Cuyahoga County, Ohio, is now under construction. Practically all of the drainage work has been completed and approximately one-fourth of the grading, which was suspended for some time due to the unusual weather conditions during the winter.

This project, known as Belvoir Boulevard, starts at Euclid Avenue and Ivanhoe Road in the City of Cleveland, and runs in a southerly direction for 14,000 feet through virgin territory, crossing only two streets although the right of way passes through three cities and one village, namely: Cleveland, East Cleveland, Cleveland Heights, and South Euclid Village, ending at Bluestone Road.

From Ledge to Pond via Bulldozer

Before work could progress, it was necessary to clear the right of way of large trees and much undergrowth. This was done by the grading contractor as part of his contract.

A cast iron pipe was laid on the edge of an abandoned quarry pond in which a fill was to be made, and then the grading contractor started at the south end on the 100-foot right of way with a maximum cut of 10 feet in rock. This cut was only 500 feet long with the quarry pond on the north end where all the waste went into a fill. It was necessary to blast this rock which was then moved with a 1¼-yard Lorain 75-B shovel. A Monarch 75 tractor equipped with a bulldozer pushed several thousand yards of this rock into the quarry pond without having to be loaded. More sandstone in layers and hard shale was encountered in the excavation, but did not necessitate further blasting.

The Novel Arrangement of the Batching Plant Fed by a Conveyor from Above

General Excavation

Due to the size of the culverts on this project, it was possible to use 1¼-yard shovels for the channel excavation. There were three box culverts, 410 feet long, 606 feet long, and 3,900 feet long respectively. One 1¼-yard Lorain shovel was started in the 410-foot box channel, and another 1¼-yard Lorain shovel on the 3,900-foot channel. Blasting was necessary on both of these excavations because of rock encountered in the 410-foot channel and a cut from 2 to 8 feet deep in hard shale on the 3,900-foot channel.

Form Work on Box Culverts

Before any work was ready for concrete, a crew was put to work making standard forms which could be used on all sizes of culverts. Ultimately 130 forms 3 feet wide, 120 forms 4 feet wide, and 50 forms 13 inches wide, all of which were 12 feet long, were made. As soon as the excavation was completed, a crew started in to set forms for the floor, using the 3-foot forms for the outside. Richmond Tyscrus were used for holding

Sections of the Box Culverts That Had Cured Sufficiently Were Used as Roadways by the Batch Trucks. Note the Water Pipe Along the Edge.

the forms rigid throughout the entire job. The day after the concrete floor had been poured, it was possible to start construction of the inside form work, which consisted of two 3-foot forms for height, the culvert being 6 feet high, two 4-foot forms and one 13-inch form on the top, the width being 10 feet. Wales were set at the right height to hold the joists supporting the top forms, those wales being held secure with the Richmond Tyscrus. These joists were held rigid with adjustable shores when there was sufficient height for them. Other timbers were used where the space was limited. Wherever cracks appeared in the forms large enough to leak mortar, a strip of roofing paper was placed over the crack. This type of construction was used on the other two boxes with the one exception that part of the sidewall was poured to make a curb for the laying of a brick invert. On this curb the 13-inch forms were used, which facilitated the setting and removal of the inside forms because they could be set up on blocks which could be knocked out after the concrete was sufficiently set to strip the forms. The forms were left in place until the concrete had developed more than enough strength to take care of any ordinary weight upon the top of the culvert. Some shoring was put in later when heavy trucks and tractors were driven over the culvert. The laying of the brick invert was accomplished before the sidewalks and top slab were poured. Asphalt was used to fill the joints on the brick.

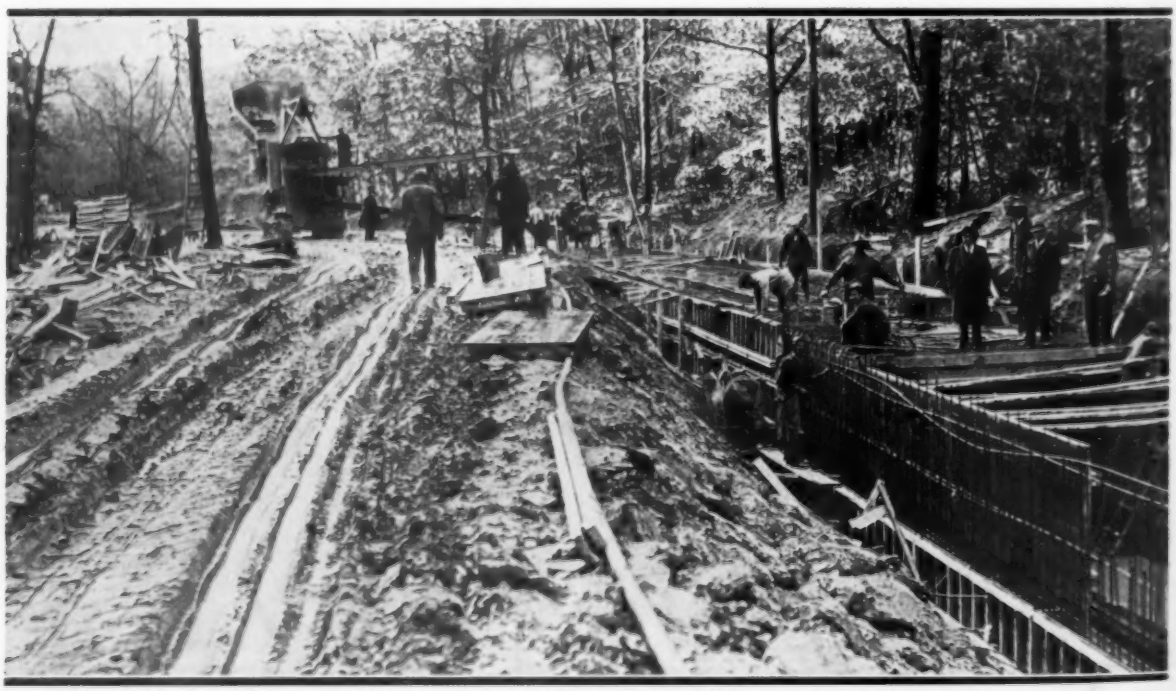
PLACING OF STEEL REINFORCING

A total of 800 tons of steel was required as reinforcing on this project. As the country is very rough, delivery could be made only as the work progressed, and a road was made to haul over. The steel for the two small culverts was delivered on the job in straight bars, and then bent on the location. The steel for the large culvert was bent at the mill and shipped in by motor truck. The placing of the steel was accomplished by a small crew using Bates wire bar ties. Small cubes of concrete were used to hold the steel the proper distance from the forms, several hundred of these being made up at one time.

PAVER PLACES CONCRETE

A MultiFoote 27-E paver was used for placing the concrete on all of these culverts, using anywhere from one to eight trucks to haul the dry batches, depending on the length of the haul and the condition of the road, which was built up with the excavated material from

(*Continued on page 31*)



The Complete Operations on the 13 x 9-foot Culvert. Note the Extended Boom of the Paver from Which the Concrete Chute Is Suspended. Placing Reinforcing and Forms in the Foreground.

Should Highway Maintenance Be Handled by Contract?

By

W. E. Ryberg

Contractor,
Salt Lake City, Utah

THE question often arises as to what is good public policy in using the contract system on public works. After an extended and comprehensive study the Day Labor method of construction was condemned by the United States Chamber of Commerce in a resolution passed six years ago. The report of the Chamber convicted day labor construction on the ground that it involved many economic hazards, the menace of which the public ought not to carry.

The great development of our country in the past and its hopes for future greatness depend on the encouragement of private initiative. The very nature of our democratic form of government is repugnant to government in business. Calvin Coolidge has always been distinctly in favor of the American system of individual enterprise. President Hoover has stated, "Even if Government conduct of business could give us more efficiency, instead of less efficiency, the fundamental objection to it would remain unaltered and unabated—the quality of opportunity is a fundamental principle of our nation."

Good Spirit But Poor Judgment

"When I was a young man out in one of the engineering districts doing work, I wanted to do it all by hired labor; I didn't want the contractor to have a look in, because in my bumptiousness and conceit I thought that I could do it cheaper than any contractor could and now even to this day I admire the spirit on the part of the young men out there in charge of the work. I admire the spirit but do not admire that judgment."

—Major General Lytle Brown, Chief of Engineers, United States Army, before the A. G. C. Executive Board Meeting of April 29, 1930.

There is no argument on the economy of using the contract method rather than the direct labor method on public construction work. It is the rule throughout the country to do practically all highway construction work by contract. There is, however, no such uniformity of practice on highway reconstruction, resurfacing and maintenance.

What Is the Difference Between Construction, Reconstruction and Maintenance?

No sharp line can be drawn between construction, reconstruction and maintenance as they merge into each other. The name by which an operation is known has no bearing on the question of using the contract method. An expression of policy in this regard which is very well stated is found in the report of a certain State Highway Department as follows:

"All operations whose cost can be accurately estimated in advance, making possible the use of open competitive bids, should be done by the contract method."

The contract method is not advocated on the grounds that contractors have any special rights. Contractors do not have and it is unfair for them to ask for any special rights. The contract method should be encouraged by officials because in giving free play to private initiative it makes for public economy.

At Times Contracting Maintenance Is Not Practical

It is admitted that the contract method is not always adapted to certain kinds of routine maintenance operation. These fall into two classes: (a) where the work can not be accurately estimated in advance, and (b) where the cost of preparing plans and inspecting the job would exceed the saving which the contractor could make over a direct labor operation not requiring such an overhead. Under this latter classification would come small routine operations and such emergencies as land slides, etc., which demand immediate action.

It has been found advisable in these days of rapid development for highway departments to conduct experiments to improve old methods and, if possible, invent new ones. Sometimes these experiments do not lend themselves readily to the contract method. Outside of these exceptions State Officials who are wide awake to the economical expenditure of road funds are bound to encourage the letting of work to competitive bids and it makes no difference whether the job is called construction, reconstruction, resurfacing or maintenance.

Careful study will show that many operations which appear at first impossible by the contract method can be so carried out satisfactorily. Investigation shows that hardly any kind of maintenance or repair work has not been done at some time by the contract method. Often it will be found that the statutes are drawn to give officials much wider powers for the conduct of day labor operations of maintenance than upon construction operations. This is used as an excuse for classifying much work as maintenance and doing it by direct labor when it could be done just as well by contract and at less cost.

Day Labor Organizations Perpetuate Themselves

It will be found that day labor operations are carried

far beyond the limits outlined. Day labor organizations not only tend to perpetuate themselves, but even to extend the scope of their operations. This is because the men directly engaged on them not only desire to save their jobs but, if possible, to increase their responsibilities and their pay. Once an equipment outfit is purchased by a Government unit and a gang of men organized to operate it, that outfit never wears out. We have heard of one case where a motor truck bituminous distributor was purchased by a state in 1915 and it is still applying tar and asphalt today. When the truck wore out a new truck was purchased and the old tank mounted on it and when the old tank wore out a new one was purchased and set on the new truck, and thus it goes on and on.

This reminds us of one of the stories told by the late Stoddard Bates, State Highway Commissioner of Vermont, about the lady who won a prize at the County Fair for a 50 year old pair of stockings. At a display of domestic art at one of the county fairs the Prize Awarding Committee noted a pair of ladies' stockings with a note pinned on them, "This pair of stockings knitted by Samantha Jones in 1860 and worn by her ever since." Not daring to doubt her word, the Committee questioned the lady and learned that she knitted new feet on them each year and new tops on them every other year.

ANSWERS TO OBJECTIONS TO MAINTENANCE BY CONTRACT

One of the first objections met in any discussion of contract maintenance is that it is impractical to prepare plans and specifications in advance. This objection applies to minor operations only. There is not a type of reconstruction or resurfacing which is not being handled by contract with excellent results. Plans and specifications can be prepared because they are being done so in a satisfactory manner, more specially on these larger operations. Even in the case of small additions and betterments, such as guard rails, culvert extensions, etc., these are also being performed by contract successfully in many places. When it comes to routine maintenance operations, the use of the contract method is less practicable, but it may surprise some to learn that the following are being performed satisfactorily by contract: patching hard surface pavements; filling cracks and joints in pavements; weed mowing on shoulders and ditches; bridge painting; furnishing, hauling and spreading of stone, gravel and other aggregates.

It is true that the preparation of plans, advertising and award of contracts necessary to competitive bidding does take time. Advance planning, a custom in every well regulated organization, eliminates this objection. The delay in starting operations is very often more apparent than real. For the purchase of equipment and materials, the contractor can move faster than the public official who must unreel red tape on any direct labor operation. We are not unmindful that emergency conditions, due principally to action of the elements, will occasionally arise but the exception should not be made a rule. As a matter of fact direct labor projects are notorious for the overtime consumed. A competent contractor once on the job, unhampered by the red tape that binds the public official, will expedite the work to much better advantage.

It has been argued that contract work is less economical. Some devotees of the day labor system are heard to say, "Why not save the cost of surveys and plans, the expense of inspection and eliminate the contractor's profit too?" As General Brown has said, one can admire that spirit, but not the judgment behind it. Any human being will be more on his toes when he knows that every move he makes will be a profit or loss to him personally. So it is that a man will do better as a contractor than the same man could possibly do as a superintendent on a day labor job. The incentive is there on the contract job, and it shows itself in better management, development of new and more economical methods and taking advantage of every opportunity to lower costs. It gives free reign to a man's initiative, because it offers a larger reward for success and a more severe penalty for failure. It is found good practice in many cases to give employees a financial interest in the business. On the other hand it will be found that folks otherwise absolutely honest look upon the Government as something to be gouged. Highway officials find this when they go to buy right of way. It crops out whenever there is a chance to get money from the Government. This is no reflection on public employees of this class, they are no worse and no better than any other class of people for human nature is much the same everywhere. The contractor works to better advantage because he must work better or pass out of the picture.

ACKNOWLEDGEMENT: A portion of a paper presented before the American Association of State Highway Officials.

Increasing Elevating Grader Capacity

THE history of William H. Dugan & Sons Co., has shown some interesting results in increasing the amount of dirt moved with an elevating grader. They moved over 1,120,000 cubic yards of dirt during 1930 and 1931 with what might be considered a small amount of equipment. This firm operates two elevating graders and thirteen McCormick-Deering industrial tractors with Trail-It wagons, of capacities from 3½ to 4 yards which operate as semi-trailers attached to the tractors. The wagons have hopper bottoms.

On a recent job at Danbury, Iowa, this company completed the moving and grading of 136,000 yards in 31 working days, with its usual equipment. On a 300,000-yard job at Danbury in 1930, this company took the contract at 15 cents a yard, a low figure for that kind of work at that location.

In September, 1929, this company started with five tractors and Trail-It wagons at Greenwood, Neb., and quickly added three more hauling units. These eight outfits kept the elevating grader running at maximum capacity while the tractors were making hauls of 1,000 feet and longer. Soon the equipment was increased by adding a second elevating grader outfit and five McCormick-Deering tractors and Trail-It wagons. The two graders and thirteen hauling units handled both long and short hauls on the same job. Four outfits were used on hauls of 300 feet and nine on hauls of 1,500 feet.

The Dugan Company has nearly doubled the capacity of the elevating grader with the tractor wagons over horse-drawn outfits. Each horse-pulled wagon holds 1½ yards, which requires 15 seconds to load. The tractor wagons of 3½-yard capacity are filled in 35 seconds. The time saving is in reducing the time the grader is idle, 15 seconds formerly being required to change wagons, while tractors do the job in 5 seconds. Another important item in reducing costs over horses is in the amount of dirt one man can haul. Tractor units travel much faster than horses. In one job they made round trips on 3,000-foot hauls in 16 minutes as against 1,000-foot haul round trips in 23 minutes with horses.

A Thousand Well Points

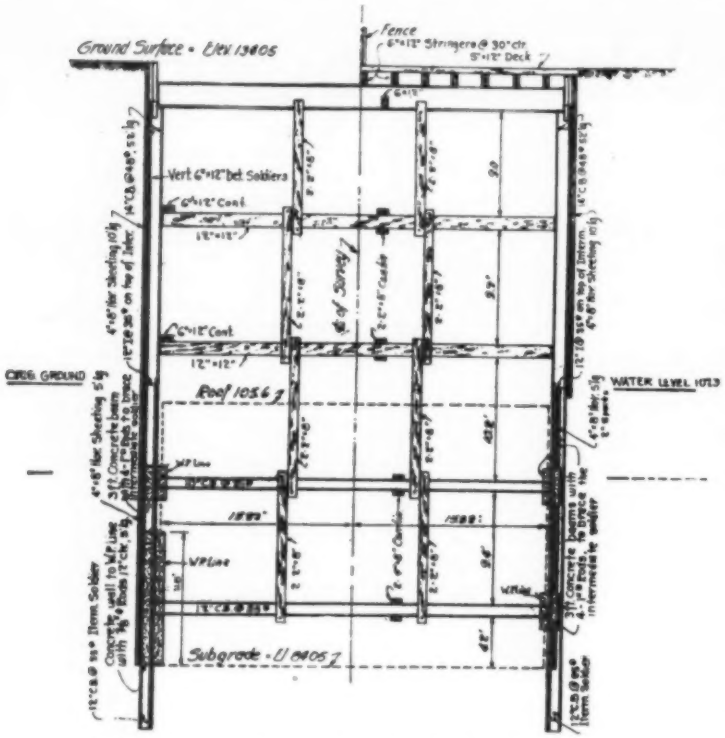
on 2,000 Feet *of* Subway

Hart & Early, Inc., Solved Many Interesting Problems on Work in the Lower East Side of New York

A PIECE of subway construction, only 1,930 feet in length, is nearing completion on the East Side of lower New York. This work required much ingenuity and patience on the part of the contractor for successful completion on time. Ground water in great quantities called for drainage devices of various sizes and types. Old style tenement structures and a building over 90 years old along the right-of-way required special underpinning procedure and methods. On the other side of the ledger were dozens of ingenious methods and devices that solved the difficulty, perhaps not the first time, but eventually and economically.

This subway is a branch of the recently completed Eighth Avenue subway which is not yet in operation. The extension crosses lower Manhattan beneath Houston Street and at Essex Street turns south to the junction of Rutgers and Madison Streets to join the new East River tunnel which is just being completed by Mason & Hangar, New York City. The initial work on the contract was the demolition of a long line of tenements and a part of an old school-house on the east side of Essex Street between the Williamsburgh Bridge Plaza and Seward Park at Hester Street. As all of the school building has been abandoned for a newer structure northwest of the old site, the contractor used the remainder of the school building for his offices, dividing the structure into a storeroom, shops and well-equipped clinic on the first floor, administration offices and accounting department and engineers' offices on the second floor and workmen's quarters above. The large area of vacant land to the east of Essex Street formed by the removal of the tenements provided an excellent

SURFACE VIEW OF THE SUBWAY WORK ON ESSEX STREET
The gas main carried overhead, the street at the left, open and decked sections of excavation and at the right, the site of the old tenements used for storage and plant



Typical Cross Section Showing Method of Timbering in the Narrower Sections

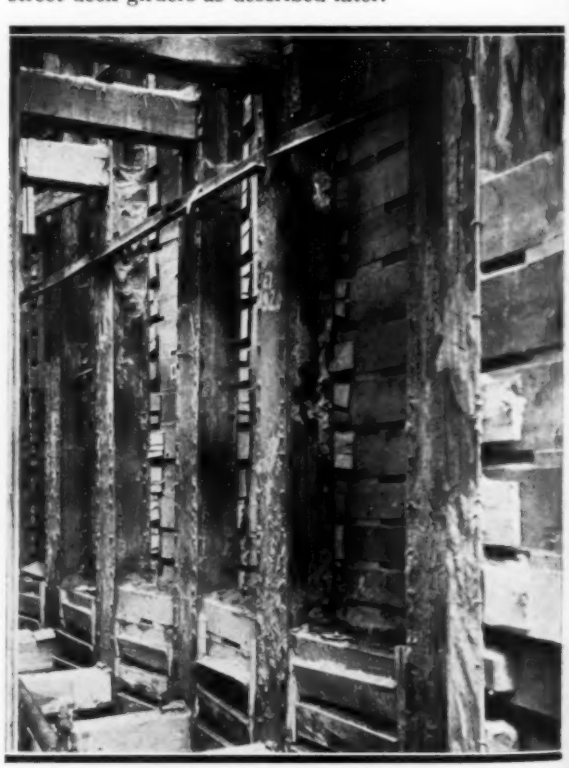
storage ground for equipment not in use and for materials. In this area, at the south end, was located the complete concrete plant, most of which was underground.

EXCAVATION

The two-track subway required a narrow trench only 33 feet wide broadening to 50 feet for the East Broadway station. The average cut was about 40 feet wide and 50 feet deep. About one-half the depth of the excavation was below ground water level but all was handled with electric power shovels without mirring as the water was handled readily by well points. The work was done by the cut and cover method where the excavation was under an existing street. The remainder of the excavation was under the area where the buildings had been removed, or under Seward Park. Most of these areas, however, were decked over for the contractor's own convenience.

The contract was delivered late in June, 1930, but it was December 1, before subway excavation actually started, the time between these dates being devoted to preliminary work. A ramp, at right angles to the line of the subway, was built near the center of the job. Excavation was started from two headings, one at either end of the base of the ramp, the north heading dug by a Bucyrus-Erie 1-yard shovel and the other heading advanced by a Marion 1-yard shovel. The cut was previously stripped to a depth of 4 to 6 feet to expose the subsurface structures of the various utility companies and to place the street deck girders as described later.

Knee Bracing of 4 x 8's to Take Up Vibration of the Decking



Built-up Box Piles at East Broadway

Well Point Installations Just Inside the Sheeting Lines

Handling the Final Excavation with a Portable Belt Conveyor

WELL POINT AND OTHER DRAINAGE

The initial drainage structure on the job was a large sump consisting of a Hart core well 9 feet 8 inches in diameter at Hester and Essex Streets. It was constructed as follows:

(1) Interlocking steel sheet piling was driven to a depth of 8 feet below the subgrade of the subway, forming the periphery of a circle which was 9 feet 3 inches in diameter.

(2) The interior was excavated to a depth of 4 feet below subgrade and a head of water was kept within the sump at all times to counteract any hydrostatic uplift which might develop.

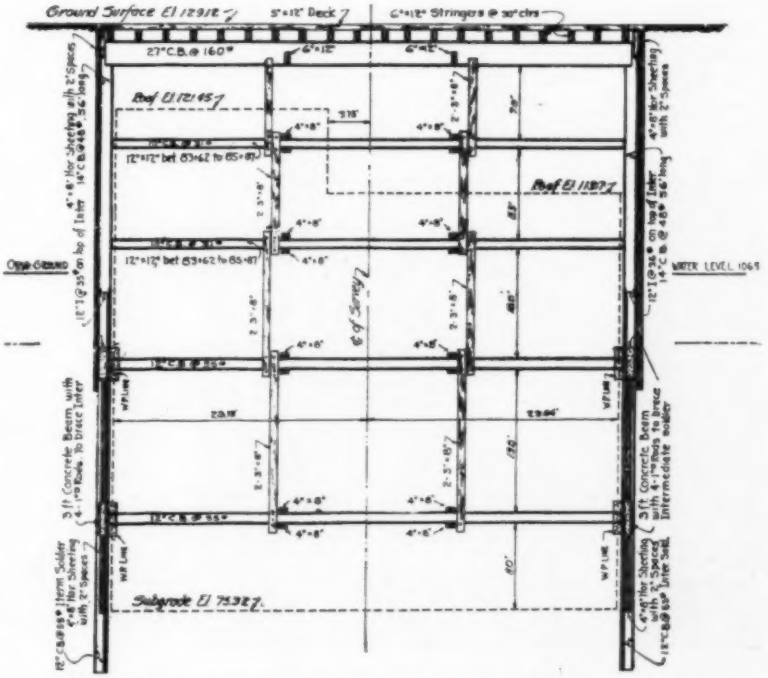
(3) Into the excavated area a 6-foot diameter squirrel cage strainer of ⅛-inch galvanized iron double mesh screen was placed and the area between the steel sheeting and the cage was filled with birdseye grit.

(4) The steel sheeting was then withdrawn.

A submersible high head pump with a 4-inch discharge was placed within the strainer and the water level controlled by an automatic float.

The contractor used hundreds of core wells totaling over 1,000 installations to keep the excavation dry below normal ground water level. The core wells were driven 16 to 22 feet deep and from 8 to 10 feet on centers in two systems, one just inside each sheeting line. The driving of these wells followed up the advance of each shovel. The installation of these core wells was similar to that of the sump on a small scale. An 8 to 10-inch wrought steel pipe was driven into the soil at the proper location by a No. 2 Union hammer and the soil core blown out with an air jet. The well point was then dropped into the pipe and the space between the pipe and the point filled with grit. The shell was then pulled out of the ground. This work was done by a crew of four men with the Universal traveling crane operating from the street decking.

The detail of the construction of the well points is interesting as it shows a flexibility of design so that the size could be changed to suit drainage and soil conditions. The screen was a fine punched bronze plate over a galvanized iron screen. A 1¼-inch pipe led into a 3-inch bushing and then into a 3-inch coupling which was connected with a 3-inch pipe 24 inches long having a series of 1 x 5-inch slots over which the screening was spaced. Some of the screens were made up with ⅛-inch galvanized iron gauze on the outside and a very fine copper screen inside. In still other screens No. 8



Cross Section of Timbering on One of the Wider Sections. Bents Are on 10-Foot Centers.

gage wire was wound on a ¾-inch pitch to separate the mesh from the slots. Two strips of strap iron in the form of a cross acted as spacers to center the well point in the larger pipe before the fine gravel was placed and the outer casing withdrawn.

Unusual shapes and sizes of well points were developed where required by the varying soil conditions. A number of well points with strainers 4 feet high and measuring 1 foot in diameter with a 2½-inch pipe leading from the strainer were used very effectively. The galvanized iron screening on these well points was reinforced at the back with slotted well casing. Another novel type of well point was the "eel pot" which was similar to that described but about 2 feet in diameter and only 1 to 1½ feet high. These types were used mostly to drain the immediate subsoil.

For dewatering the well points, sump and "eel pots" electrically-driven self-priming centrifugal pumps were used to create a vacuum on their respective manifold lines, each of which cared for some 40 to 50 points. A Sterling deep well pump was used in a 12-inch core well in Seward Park where a favorable gravel strata just below subgrade was tapped.

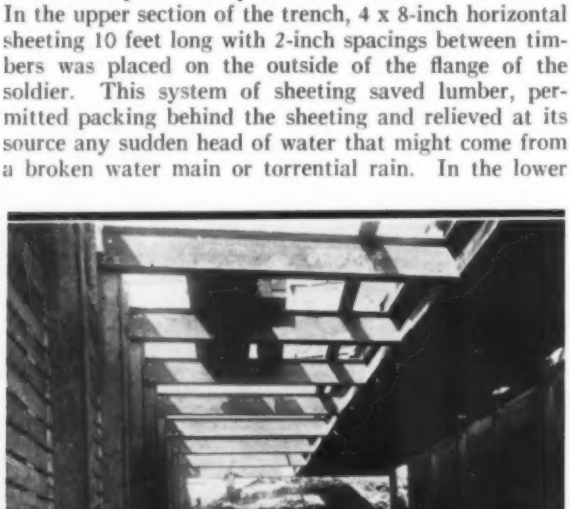
Soldiers and Trench Bracing

After the ground was stripped, 14-inch 48-pound Carnegie beams from 54 to 62 feet long were driven on 10-foot centers on each net line of the structure. These soldier beams were driven with a McKiernan-Terry 9-B-2 air hammer handled by a Marion 450 electrically-driven shovel with a 70-foot boom which towered well above most of the five-story houses along the streets. The crane and boom are shown on the front cover and cross sections showing typical trench bracing are shown in the accompanying diagrams. The struts were placed every 10 feet from soldier to soldier. In the upper section of the trench, 4 x 8-inch horizontal sheeting 10 feet long with 2-inch spacings between timbers was placed on the outside of the flange of the soldier. This system of sheeting saved lumber, permitted packing behind the sheeting and relieved at its source any sudden head of water that might come from a broken water main or torrential rain. In the lower half of the excavation, intermediate soldiers were driven mid-way between the primary beams. The horizontal sheeting on the intermediate soldiers was usually carried against the inside flanges. To brace and keep the secondary soldiers in line reinforced concrete ranger beams, 3 feet high reinforced with four 1-inch square rods, were used. These concrete rangers transferred the load from the intermediate soldiers to the struts against the primary beams.

Where the excavation was 42 feet wide, 24-inch 110-pound I-beams spanned the top of the trench supported by the main vertical soldier beams. This cross beam acted as a strut and also supported the 6 x 12-inch stringers which were set on 30-foot centers and covered with a 5 x 12-inch timber decking to form the roadway. On the deeper and wider cuts, 27-inch 160-pound I-beams were used for the top with 10 and 12-inch I-beams for the lower tiers of cross bracing. On the narrower trenches 12 x 12 timbers were used for the two upper braces followed by a 10-inch 31-pound I-beam for the third and for the bottom one, a 12-inch 55-pound I-beam.

In order to counteract any tendency for the lines of struts to creep or move, the contractor used diagonal bracing in both the upper and lower levels of the wider trenches. The longitudinal bracing in a horizontal plane was placed in a plow formation, thus transmitting any movement to the sides of the cut. Two hangers of 4 x 8 timber for each brace supplied the vertical rigidity necessary.

The first cut of 18 to 20 feet with the shovel carried the level down to about 1 foot above ground water. This gave sufficient head room for the shovel and was the grade at which the secondary soldiers were driven. In addition to using the electric shovels in the cut, the two Universal cranes with ½-yard Williams clamshell buckets and one of the Marion cranes with an Owen ¾-yard bucket were used for cleaning up the shoulder along the edge of the trench. The lower 4 feet of excavation was done primarily by hand shoveling to two Haiss inclined belt conveyors which delivered the material to trucks running on planks near the subgrade level.



A 1-YARD ELECTRIC SHOVEL AT WORK
Note the soldier beams, 4 x 8-inch horizontal sheeting, and decking over one half of the excavation

A Substitute for Underpinning

In the section from Broome to Canal Streets a retaining wall was built in the lower section of the excavation on the west side of the cut, toward the remaining five-story tenements. This concrete retaining wall was built in 3-foot lifts from the top to the bottom coincident with the excavation to a total depth of 12 feet and was used in lieu of underpinning. These tenements were so old that the contractor felt it advisable to retain the soil that supported the building footings rather than underpin the structures directly.

Delivery of Materials for Concrete

Delivery of sand and gravel as well as cement in lower New York must be handled either by lighter or by truck. On this contract sand and gravel were delivered by the Colonial Sand & Gravel Co. to the ramp of the contractor's concrete plant by trucks which dumped into the three-compartment bin. There was one section for 1½-inch gravel, a small section for ¾-inch gravel and larger compartment for sand.

The handling of cement on this contract was unique

in subway construction. The contractor erected a large cement bin capable of holding 150 tons of bulk cement. Atlas cement was delivered by lighter at Pier 30, East River, and hauled from there by the contractor's trucks or from the 30th Street yard of the New York Central Railroad. All cement was delivered in N. Y. C. steel containers, each carrying 5½ tons. The lighter derrick loaded the containers from the barge to the truck. In the yard the railroad had a crane which loaded the trucks from the rail shipment.

At the contractor's concrete plant, the containers were picked up by a P & H traveling crane by means of a special equalizing hitch which permitted the use of six hooks on the container. The crane runway, from the outer end where the trucks stopped, to the inner end directly over the center of the bulk cement bin, was about 100 feet. The crane was handled by one man in a control car which moved with the crane. The containers were let down to the surface of the cement in the bin and there the bottom gates were tripped so that the container was pulled up, permitting the cement to flow out into the bin. This eliminated much of the dust nuisance which is inevitable where cement is dumped in the usual manner by tipping a cart or container.

The concrete plant consisted of a Rex 1-yard mixer, a loading skip, and three batchers which were located underground against an existing wall of the old school. This wall in its upper elevation served as one side of the aggregate and cement bins. A boiler installed in the pit alongside the mixer furnished steam for heating the aggregate when necessary. The cement and sand for the concrete were weighed in Butler batchers and the gravel measured by volume. The bulk cement bin was well housed and had a tarpaulin cover on rollers and wires. Occasionally when the bulk cement would not flow because of arching action, compressed air jets were used to loosen the cement.

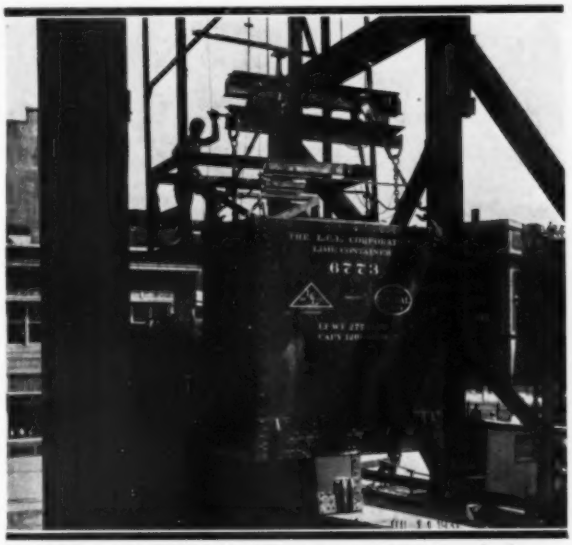
The 1:2:4 concrete was chuted from the mixer into a 1-yard bucket running in the 78-foot steel tower. When the bucket was descending, it struck a cable at the bottom of the tower which flipped the chute from the mixer into position. At ground level, the contractor built a heavy frame work, 10 feet high, and on this constructed a 3-yard concrete hopper. The fleet of International trucks with Easton roll-over dump bodies drove under the hopper, received their loads of concrete and delivered them to the job through chutes on the open side of the excavation.

Particularly good concrete form work was noticeable on this job and was due in large measure to the lining of the forms with Masonite Presdwood, particularly in the station ceilings. This eliminated the necessity of hand finishing after the forms were stripped. The forms for the side walls of the stations were not lined with Prestwood because a tile finish was to be placed later.

The entire concrete plant was operated by three men above ground, a crane operator, hoist man and a dump man who handled the aggregate trucks. Below ground there was a batch man, mixer operator and fireman for the boiler.

MISCELLANEOUS ITEMS

All the walls on this contract were rendered moisture-proof with 4-ply waterproofing and all plane or horizontal surfaces had a single layer of bricks in asphalt mastic. This mastic was mixed in a machine similar to the old style continuous plaster mixers and operated by a ¾-horsepower motor working on a 220-volt circuit. The asphalt was first melted so that it would flow readily and then heated to a temperature of 450 degrees for mixing the sand and asphalt.



One of the Steel Bulk Cement Containers and the Traveling Crane with Special Equalizing Hitch

At East Broadway, it was necessary to underpin the building whose west and south faces were practically on the sheeting line of the subway. A built-up box pile made up of 6-foot pieces of 12-inch channel and ⅝-inch plate was jacked down in sections, filled with concrete and tested to serve as an underpinning pile and a vertical wale for the sheeting.

PERSONNEL

Section 3 of Route 103 of the Eighth Avenue subway extension was built by Hart & Early Co., Inc., New York City, of which J. P. A. Hart is President and General Superintendent, F. L. O'Connell, Vice President and Ralph W. Greenlaw, Secretary-Treasurer and Chief Engineer. The work was designed and the contract awarded by the Board of Transportation of New York City, Robert Ridgway, Chief Engineer and Colonel John R. Slattery, Deputy Chief Engineer in charge of construction. Samuel Friedman was Resident Engineer for the Board of Transportation on this section.

Boost the Emergency Highway Bill

The Emergency Highway Construction Bill, H. R. 9642, should make headway, now that the budget is balanced. Every effort must be put forth to secure a two-thirds vote on this bill to permit its passage over the threatened veto of the President. A similar bill a year ago fostered by the same Administration as an aid to unemployment did much to provide help in many states. The money expended will be repaid; it is not a gift like the Bonus!

Building an Underpass *on the* C N R

W. H. Yates Construction Co. Ltd., Had Little Space in Yards for Central Mixing Plant at London, Ontario

The Complete Central Mixing Plant for the Wellington Street and Richmond Street Underpasses in London, Ontario

AS part of the program for the elimination of certain grade crossings in London, Ontario, the largest city between Hamilton and Windsor, and the center for all mid-Ontario trade activities, the Canadian National Railway and the City of London are preparing to construct a total of six subways or underpasses for streets, one overhead bridge and the reconstruction of the railroad station. The first part of the work undertaken was the Wellington Street and the Richmond Street underpasses and the relocation of the C N R tracks and raising of the grade.

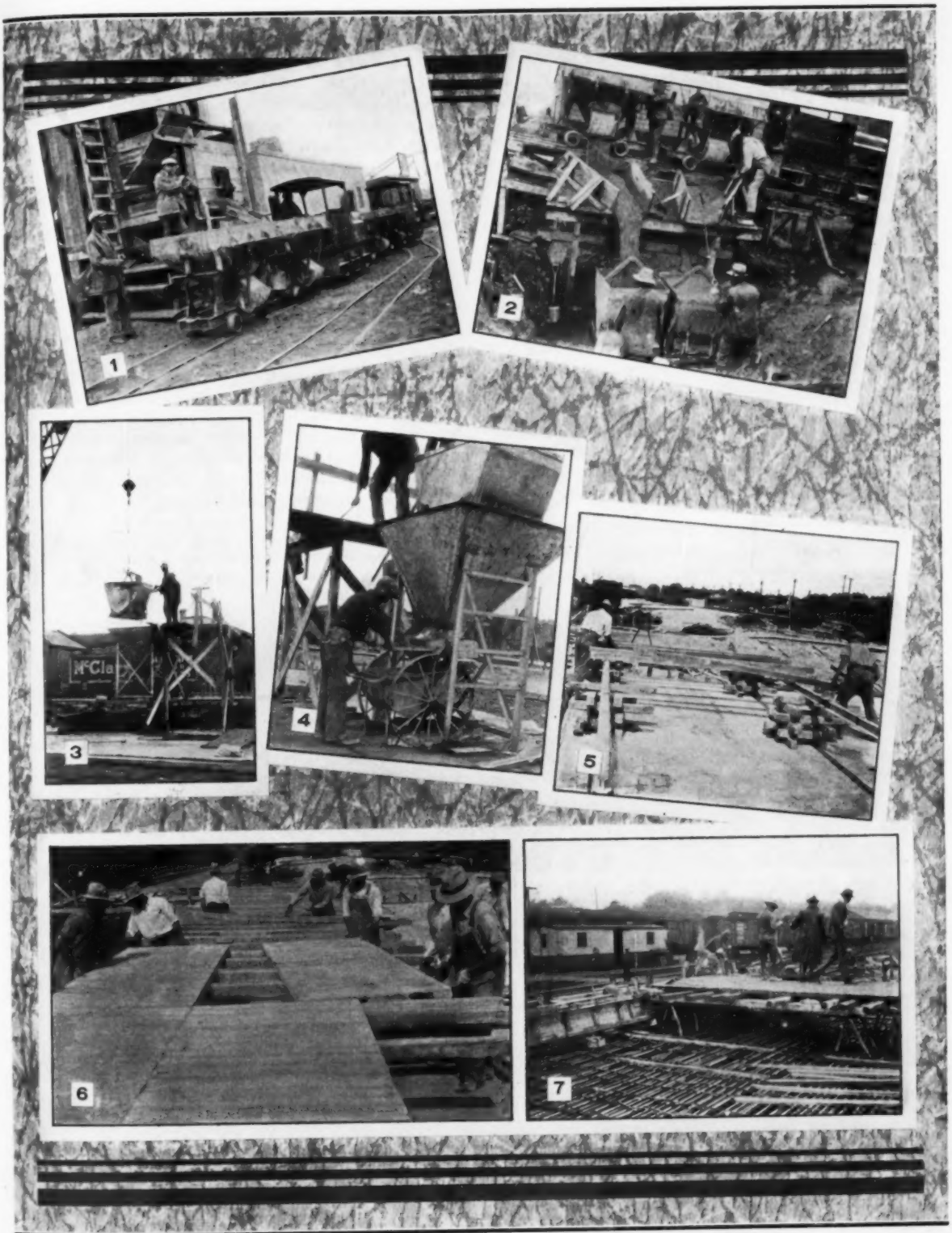
The contract for the two underpasses mentioned above was let as a unit and called for the excavation of 40,800 cubic yards of earth, the pouring of 13,640 cubic yards of concrete in which was set 1,091,500 pounds of reinforcing steel, 3,400 square feet of welded mesh reinforcement, and 10,500 linear feet of old rail reinforcement. The underpasses are each 750 feet long including the subway and approaches and have a top slab 2 feet 6 inches thick. The subway proper in each case was 260 feet long. The Wellington Street subway had thinner approach walls with more reinforcing and were designed for minimum thickness with a maximum of strength. The abutments were of mass concrete.

The excavation for the footings and barrel of the subway was handled by two Erie ¾-yard steam shovels followed by a pneumatic clay spader operated by a Sullivan compressor. The Canadian National Railway underpinned its own tracks on the north and also the London & Port Stanley Railroad, a municipally owned interurban fast electric line with a single track on the south.

Central Mixing Plant Squeezed into Small Space

The central mixing plant which the contractor built to handle all the concrete for the two subways was located about half-way between the two underpasses at the only site available within a considerable distance. It was between the C N R tracks in the freight yard and required considerable ingenuity to fit the plant and stockpiles into the space. Storage for only five freight cars of aggregate was available on the construction spur so that the stockpiles were of even more importance than on the usual concrete job where they tide over short periods when cars of aggregate are delayed.

The sand and gravel were unloaded from the cars by a stiffleg derrick and an Owen ¾-yard clamshell bucket and placed either in the rather large stockpiles or directly into the Blaw-Knox batcher plant bins. Batching of the concrete aggregate was by volume and the cement by weight. The average batch consisted of 13½



HANDLING THE CONCRETE FOR THE WELLINGTON STREET UNDERPASS

1. *Loading the industrial train of two side-dump cars fro m the storage hopper at the central mixing plant.* 2. *Discharging concrete from the industrial cars through chutes to the bottom-dump concrete buckets.* 3. *Swinging a concrete bucket to the loading hopper on the deck.* 4. *Loading a concrete buggy from the deck hopper.* 5. *Setting up a runway on* 4 *x* 4*-inch cribbing and old railroad rails.* 6. *Placing the* 4 *x* 8*-foot flooring on the* 4 *x* 4*-inch stringers to complete the runway.* 7. *A section of runway over the portion of the deck to be poured, showing the metal supports.*

cubic feet of sand inundated, 17½ cubic feet of stone, 605 pounds of cement and 28 Imperial gallons of water. The batch was mixed 1¼ minutes after the cement was in the London 1-yard concrete mixer. The batch was designed to give 3,000-pound concrete and actually produced 5,000-pound concrete most of the time.

The cement was unloaded from the freight cars by gravity roller conveyors to the cement storage shed where it was stacked ready for use. During the pouring of concrete the cement bags were emptied into the boot of a bucket conveyor which carried it to the cement bin at the top of the plant above the cement batcher. City water was used for the inundating and mixing water throughout the work.

HANDLING THE CONCRETE FROM MIXER TO FORMS

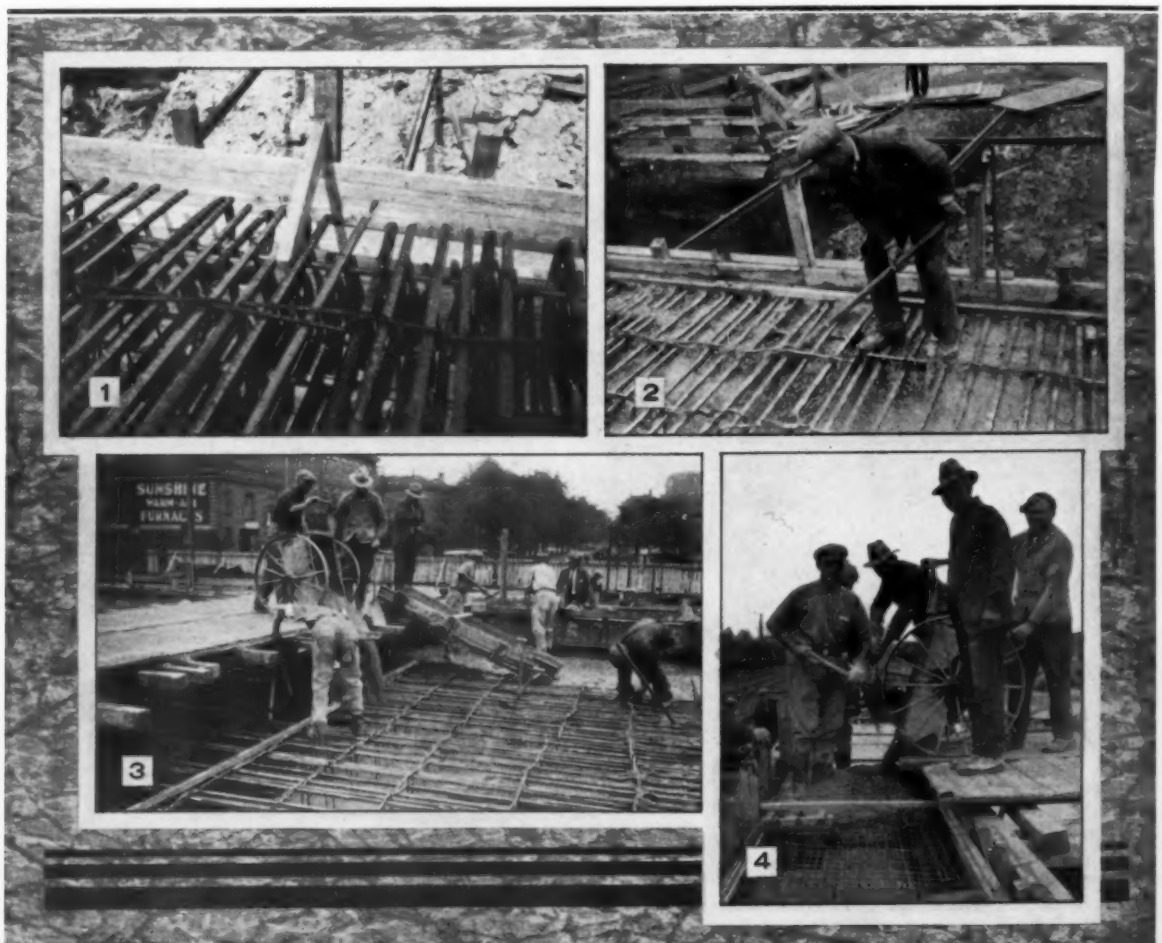
After mixing for a minimum of 1¼ minutes the concrete was dumped from the mixer into a receiving hopper with a sluice gate control and a hinged chute to permit loading the two-car trains. Each car had a 1-yard hopper with a gate so that the concrete could be delivered from the side of the car into a bucket for transfer to the forms or buggies. There were two trains operating on the 24-inch gage industrial track with two 5-ton Plymouth gasoline locomotives. There was a run-around switch at the concrete hopper for the empty train while the full train was being loaded.

In pouring the Wellington Street subway slab which was 2 feet 6 inches thick and required a considerable amount of concrete the industrial trains ran up a slight incline and discharged through two separate wood chutes into two bottom-dump concrete buckets. These were moved to the steel hopper on the buggy runways by an American crane with a 50-foot boom. The buckets were dumped into the hopper and then the buggies were filled from that as required.

The runways were supported on the previous section of slab that had been poured and cured. Cribs of 4 x 4-inch lumber were built up to hold old rails running longitudinally and then 4 x 4-inch stringers were carried across on which the 4 x 8-foot flooring was laid for the buggies to run upon.

The largest pour in one day was 300 cubic yards with this outfit running 10 hours. The plant was equipped with a floodlight for use in case of runs after dark but this was used only once on an unusually long pour where delays in the plant made night work necessary on a

(Continued on page 37)



PLACING CONCRETE AROUND HEAVY REINFORCING

1. A close-up of the unusually heavy reinforcing in the deck of the underpass which will carry heavy freight and passenger railroad traffic. 2. Adjusting the top reinforcing bars to give the proper spacing after part of the concrete had been poured. 3. Pouring concrete for the deck. 4. Pouring the parapet.

Paving Methods *of a* South Jersey Contractor

"Jake" Gentile Made Good Progress on Section 4 of Route S-41 Leading from Philadelphia Via Palmyra Bridge to New Jersey Shore Resorts

MINIATURE golf is not considered as one of the requisites of a paving contractor's job, but at the traffic circle on Giacomo Gentile's job on Route S-41 there was a sign inviting all who would play to join in the festivities at 10 cents a round. When we visited the "circle" there were plenty of holes—left by passing automobiles in the mud alongside the paving around the traffic circle. What a change a few months can make! Motorists now see only a well-paved three-lane pavement around a circle with shrubbery carefully planted and protected by a shining white curb in front of which is a 1-foot strip of black asphalt paint to set off the whiteness so that it will shine like "a nigger's eye in the dark."

The job was divided into two approximately equal parts by the traffic circle and runs from north to south, ending in an overpass for south bound traffic over the White Horse Pike leading to Atlantic City. The section from the north end to the traffic circle consists of two 10-foot slabs 9 inches uniform thickness with two 10-foot gravel shoulders making a 40-foot roadway. The section to the south of the circle has one 10-foot slab to the right of the center line and two 10-foot strips to the left. The narrow side has an 18-foot gravel shoulder and the wider side an 8-foot gravel shoulder, making a 56-foot roadway. Where the road connects with White Horse Pike it divides into two ramps, known as East and West. A 20-foot concrete pavement carries the traffic south over the White Horse Pike and turns back to meet the Pike with a reverse curve. The north bound traffic is carried on a 20-foot concrete pavement which curves from the Pike and connects with the west ramp to make a 40-foot pavement.

The Rondpoint or traffic circle was originally designed with tangents and rounded corners but as finally constructed it is a circle of 100-foot radius with four triangular paved islands of black concrete dividing traffic approaching the circle from that going around the circle. The roadways around the circle are 40 feet wide. Toward the north the pavement at the circle is 56 feet wide, composed of four 10-foot strips and two 8-foot strips and the same leaving the circle in a southerly direction.

The 200-foot circle is planted with low shrubbery and has a metered sprinkling system for maintenance. The curbs on the triangular plots as mentioned in the introduction are of white concrete and are paved with black concrete to which 30 per cent oxide of iron had been added to contrast with the curb. Similarly the area in front of the curbs is painted to a width of 1 foot with a black asphalt paint.

QUANTITIES

Unclassified excavation	73,336 cubic yards
Wet excavation, i.e., material that cannot be used as fill, including muck	4,118 cubic yards
Preparation of subgrade	75,289 square yards
9-inch reinforced concrete pavement	75,289 square yards
7½-inch gravel surface for shoulders	50,820 square yards
7-inch penetration macadam, temporary approach to overpass	1,050 square yards
Concrete sidewalk	373 square yards
8-inch concrete curb	2,748 linear feet
Special white curb in triangles for safety	767 linear feet
Special black concrete on sidewalk for contrast	561 square yards
Borrow (Later about 3,000 yards were added to this figure)	5,223 cubic yards
18-inch cast iron pipe for culvert and drain	1,472 linear feet
24-inch cast iron pipe for culvert and drain	132 linear feet
30-inch cast iron pipe for culvert and drain	146 linear feet
18-inch double strength vitrified clay pipe	460 linear feet
24-inch double strength vitrified clay pipe	1,018 linear feet
Concrete header for use where side roads enter	460 linear feet
Various types of concrete inlets	22 units
Wire rope guard rail	4,593 linear feet
Top soiling	60,980 square yards
Seeding and fertilizing	60,980 square yards
Lump sum bid	$262,000

GRADING

Grading started promptly after the contract was awarded in September, 1930. Concreting was started on April 2, 1931, and the work was completed shortly after the first of July, 1931. The unclassified excavation was practically all a sandy soil which was handled by a ¾-yard Northwest shovel, a ¾-yard Osgood shovel and a Keystone excavator in about three months actual working time. The excavated material was spread and rolled in 8-inch layers by Caterpillar Thirty and Sixty tractors hauling graders with 8-foot blades. The contractor uses 8-foot blades to the exclusion of longer ones as he feels that better work can be done with the shorter blade and with fewer trips over the work.

FINE GRADE AND FORM SETTING

The contractor used two one-man graders between the forms to give an even grade which was compacted with an Austin 5-ton Pup roller. The fine grade machines were one Gilbert grader with McCormick-Deering power and a Trackson-McCormick-Deering one-man grader. The form setting and fine grade gang consisted of three men setting the forms and two men working on the final grade. The fine grade crew used a home-made grade board made of heavy timber to give the final shape to the base. Following as closely behind as possible was the man setting the Elastite expansion joints as bulkheads with an equal leg cap on the top and six dowels run through the joint. Special chairs of iron ribbon were used to insure the correct position of the dowels horizontally and one end of each dowel was covered with a cardboard tube with a cork glued into the end to allow the dowels to move in as the slabs expanded. Following the setting of the expansion joints there was one man to oil the forms and the expansion joint caps.

The dowel pins for the expansion joints were dipped in Tarvia K-P in a vat at the batcher plant before being taken out on the job.

BATCHING THE AGGREGATES

The batching plant was set up at about the mid-point of the job and about one-eighth mile off the job, on a spur track along the main line of the Pennsylvania Railroad to Atlantic City. Gravel was shipped in by rail from the Carpenterville, N. J., plant of the North Jersey Sand & Stone Co. It was unloaded by an Osgood Conqueror crane with a one-yard Owen bucket. The crane was powered with a Le Roi 6-cylinder motor. The contractor is now equipping all his machines with 6-cylinder engines instead of fours. The gravel cars were moved by placing a wire rope sling over the end of the car and in the hook on the crane and then pulling with the crane. Sand was trucked to the site of the batching plant by the contractor, using hired trucks, from a pit of the Atlantic State Construction Co., Tansboro, N. J., about 3 miles distant. The fleet of hired 3-batch trucks backed into a pit under the Blaw-Knox batcher and then pulled out to the mixer. There were two 3-batch trucks hauling to the Koehring paver and three to the Ransome, the difference in number being due to the length of haul.

The individual batches for the 7-bag mixers were composed of 1,020 pounds of sand, 984 pounds of 1½-inch gravel, 1,478 pounds of ¾-inch gravel and 7 bags of Lone Star cement. The cement was not loaded on the batches but was handled from the cement cars on flat bed trucks at a siding about a quarter mile distant. One man on each of the two cement cars, with the help of the drivers of the flat bed trucks, loaded the cement bags onto the trucks. Two trucks were hired for this work and two belonged to the contractor.

The labor organization at the batcher plant consisted of one man in the cars, the crane operator and the batcher man.

THE CONCRETE ORGANIZATION

On arriving at the paver a batch truck would pass the paver and pull ahead of it, then back to the skip. Immediately following the truck would come a flat bed truck with the cement. At the paver one man stayed on the cement truck to cut the wires on the bags, another handled four of the seven bags of cement and the remaining three were handled by the man who dumped the batches from the trucks. An extra man helped dump the batches and signalled to the truck drivers.

There was an operator for the Ransome 27-E paver which was powered with a Buda 6-cylinder motor. Two men on final grade kept the base in A1 condition. The day this job was visited was the third of a group during which there were light showers every quarter hour. In addition there had been several very heavy rains at night. Fortunately the soil was sandy so that the drainage was good but there was considerable light clay in the upper layer which was rather messy on the grade. The engineer required that this be stabilized with some dry earth thrown on. The contractor quickly figured the cost of putting several men onto this work to hand shovel dry earth from some distant pit into a truck and haul it to the grade and decided it was better to give the state 9½ inches of concrete where the grade was wet rather than go to the trouble of getting the dry earth. Consequently two men who ordinarily worked on the final grade simply shoveled out the sloppy spots and paving went on as usual.

Behind the paver were three men spreading the concrete and a Lakewood power screed or finishing machine leveling it to 2 inches below the top grade so that the

National welded steel fabric and the "hair pins" or corner bars could be placed easily at the proper elevation in the slab. The welded fabric was made up of No. 5 and No. 00 wires in a 9 x 12-inch mesh with the heavier wires running transversely and spaced 12 inches apart. The fabric weighed 79 pounds per 108 square feet. The expansion joints were spaced 34 feet 4 inches apart. New Jersey required 1¾ minutes mix on all paving work during 1931 which permitted a complete cycle every two minutes if the organization was working to good efficiency. The water for the batches averaged 22 gallons per batch.

FINISHING THE SLAB

Aiding the three men in the "mud" was one man who spaded along the 9-inch Blaw-Knox forms while the operator of the Lakewood screed spaded on the other side. There were two men on the planer which consisted of an inverted channel with two U-shaped light pipe handles. The finishers handled a wooden belt which gave the final finish to the pavement before straightedging and brooming. The finishers also cut out the expansion joints leaving them open to be poured later. For this work an Aeroil asphalt kettle was used and easily pulled along from one joint to the next.

Curing the slab was entirely by the use of Curcrete, an asphalt emulsion sprayed on from a small tank equipped with a pump and gasoline engine. One man was all that was required for this work instead of the much larger crew required for curing with hay or earth after burlap had been applied, sprinkled and removed.

There was another complete concreting organization working in the same manner as that described except that a Koehring 27-E paver was used.

On the day following pouring, the 9-inch forms were pulled by one or two men using an effective home-made form puller. It consisted of a wood lever arm with 6 feet of arm on the working side and one foot on the pulling side. A dowel pin bent into a U with the ends turned up to form hooks was attached to the pulling end with a bolt coupling from a tractor. The heavy 9-inch forms came up on the first or second time the man applied his weight to the end of the arm. The puller was held up by two legs of strap iron with flat feet and a board was carried along to prevent the puller marring the green concrete. The puller might have been improved somewhat if the board had been attached to the feet of the puller.

WATER SUPPLY

Two years ago contractors prayed for some rain that concrete work might not be shut down. Last summer in many places there was a bit too much water to suit—it is never quite right. The contractor on this job did not have a single creek or pond within several miles of the work. There was, however, a swampy area with

SOME DETAILS OF THE GIACOMO GENTILE CONTRACT

1. *A crane with a 1-yard bucket handled gravel or sand from gondola cars or stockpile as needed by the batchers.* 2. *Method of supporting dowels at an expansion joint.* 3. *A home-made form puller of a piece of strap iron and a bent reinforcing rod.* 4. *Close-up of the form puller. It was always placed on a board so as not to mar the green concrete.*

plenty of water beneath the surface and without too much organic matter. Four 2-inch wells were driven to depths from 32 to 35 feet and hooked up to a C. H. & E. pump. One man was in constant attendance on the pump because water is the life blood of any concrete job. The water was piped along the shoulder in 2-inch pipe with taps for the paver hose every 500 feet. The pavers carried 400 feet of hose.

GRAVELING THE SHOULDERS

Seven hired trucks, paid by the hour as were all the rented trucks on this job, hauled gravel from a pit about ½-mile off the job. The contractor loaded them with a Northwest shovel powered with a 6-cylinder Wisconsin motor. These trucks had their tail gates snubbed with a loop of chain so that they could not drop the full swing. This made it possible to spread the gravel along the shoulders with remarkable uniformity and minimized the grader work.

When the shoulder stripping was in progress, before paving started in any one section, a Keystone excavator with a skimmer scoop was used to remove any good top soil and stock it alongside or load it into trucks for use as dressing on the slopes in the few cuts. The cuts were all handled by the Osgood Conqueror with a 1¼-yard bucket. Considerable wet excavation of muck along the right of way was also saved and used for slope dressing.

A COUPLE OF DETAILS

The contractor arranged with the local station of the Gulf Refining Co. to "gas" the equipment each day. The truck started at one end of the work and ran right through, supplying gasoline and oil to every piece of equipment as needed.

A new method of handling the steel fabric was employed on this job. Many contractors unload the steel as soon as it arrives and stock it in the batcher yard or elsewhere until needed on the job. Then they usually string it out piece by piece as needed for each mile or two. Gentile moved his steel direct to the job from the cars by truck loads, stacking the whole loads at proper intervals. Then as the paver approached, the fine grade crew strung out the steel along the shoulder ready for the steel setters. This minimized the handling of the steel and it was always ready ahead when needed and one handling was done away with completely.

For pouring the curb and sidewalk the contractor used a Smith 2-bag side discharge mixer mounted on steel wheels to facilitate moving it along the forms.

PERSONNEL

The contractor for this 4.11-mile project was Giacomo Gentile of Bridgeton, N. J., who acted as his own Superintendent assisted by his daughter, Clementina Gentile. For the State Highway Department the work was in charge of E. W. Packer, Resident Engineer, assisted by George Pratley, Highway Inspector.

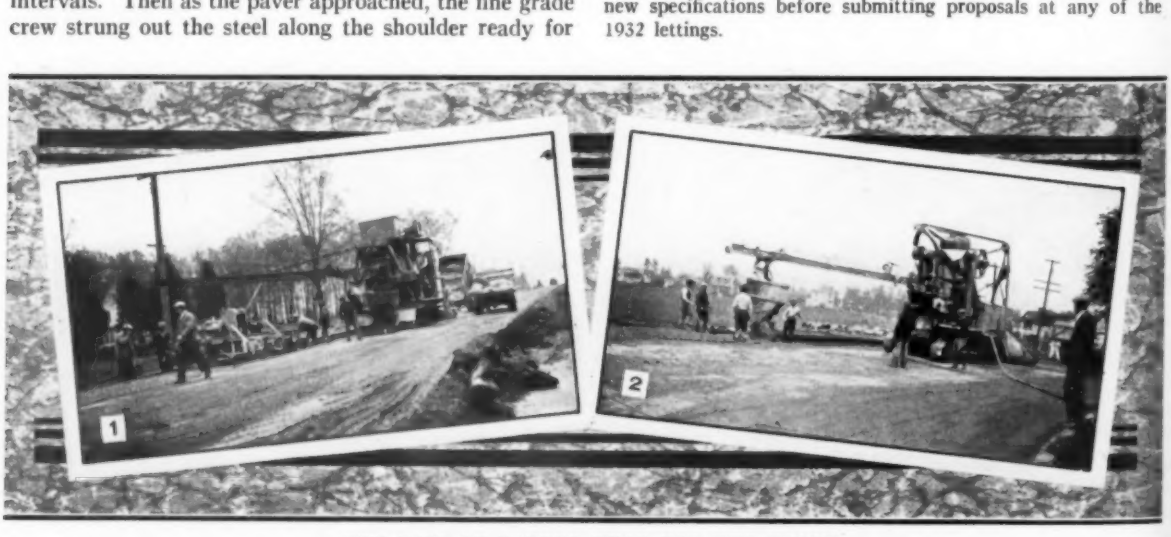
North Dakota's 1932 Specifications

ATTENTION has been called by the North Dakota Department of State Highways to the following features of the 1932 structural specifications, most of which features constitute changes from or additions to the previous specifications.

Class A concrete has been changed from 2,500 pounds per square inch with a minimum of five sacks of cement per cubic yard to 3,500 pounds per square inch with a minimum of six sacks of cement per cubic yard. This class of concrete will be used for all parts of all ordinary bridges and box culverts. A section headed "Concrete Bridges" and one headed "Steel Bridges" have been included to take care of some general requirements not covered in the individual item specifications.

The Basis of Payment for Structural Steel has been changed from scale weights to computed weights with no deductions for cuts, copes and open holes, a flat percentage being added for rivets, bolts, etc., paint and over run. It is expected that this method of computation will give approximately the same results as the one used by the American Institute of Steel Construction. Other changes in the specifications are: the greasing of sliding surfaces of expansion bearings with heavy graphite grease is required; wire ties in forms are entirely prohibited; specifications for temporary crossing and detour and for removing the old structure have been included; and a section on "Paints and Painting" has been written. Paint specifications will not appear on the plans as was the case last year.

Bidders should familiarize themselves with all parts of the new specifications before submitting proposals at any of the 1932 lettings.



THE PAIR OF PAVERS THAT DID THE TRICK

1. *The Ransome 27-E with a 3-batch truck and the cement truck alongside followed up by a Lakewood finisher.* 2. *The Koehring 27-E paver pouring the outside strip at the large traffic circle.*

Using Bulk Cement on Huge Building Project

MORE general use of bulk cement in extensive building and construction projects may result from the experience now being gained in the construction of the new Union Inland Terminal by the Port of New York Authority. Owing to the size of this undertaking, many unusual problems have developed, leading to the adoption of new methods. The handling of the cement alone was of particular concern as it involved the transportation, receipt and dry storage at the site of 160,000 barrels.

The terminal, which covers the entire block bounded by Eighth and Ninth Avenues, West 15th and 16th Streets, in Manhattan, will be sixteen stories high and will be ready for occupancy on all floors in December. It will have a floor area of 2,400,000 square feet and its volume of 37,600,000 cubic feet will surpass all other structures in the city.

As far back as the days of the Panama Canal, consideration was given to the use of bulk cement, but at that time there were no machinery or equipment for handling or transporting cement except in bags or packages of some kind. It is only during the past four or five years that equipment has been devised for the economical and satisfactory handling of cement in bulk and even now it is still more or less in the experimental stage. A plan for the handling of cement in bulk which seemed to offer many advantages over the use of bagged cement was worked out by the Turner Construction Co., the general contractor, in cooperation with the Penn-Dixie Cement Corp., the Lackawanna Railroad and the Port Authority engineers. The outcome has been thoroughly successful. The dust nuisance has been eliminated, costs are less and concrete satisfying the rigorous specifications is produced. The cement for the Inland Terminal Building is manufactured at Nazareth, Penna., and is loaded directly by conveyor from tested bins into steel cars which are especially designed with a waterproof body and roof so that there is no chance for the absorption of moisture during the period of transportation. The cars are floated from Hoboken to the unloading plant at the foot of West 28th Street. Here waterproof and dustproof connections are made to the discharge hoppers on the cars and the cement is fed by a screw conveyor into a steel storage bin of about 500-barrel capacity.

Trucks with specially-designed dust and waterproof steel bodies and roofs receive the cement from the bins by gravity through a hatchway in the roof of the truck. A vent from the truck body is piped into the cement bin during the loading operation so that there is no dust or loss of cement. These trucks, which have a capacity of 55 barrels of cement, have self-cleaning bodies so that the cement may be discharged from a spigot at the rear of the truck. When a truckload arrives at the building it is driven into either one of the driveways located about 150 feet from Eighth and Ninth Avenues and running from 15th to 16th Street, and discharges its load through a canvas boot or tube attached to the spigot into a hatchway in the floor of the driveway connected with a 500-barrel steel bin. The discharge screw in the truck is driven by the main motor of the truck at a speed sufficient to discharge the contents in about five minutes.

The cement is fed from this receiving and storage bin through two power-driven feed gates to a horizontal conveyor and in turn to a vertical conveyor which elevates the cement into a 280-barrel operating bin located over the mixing plant. These two units of screw conveyors are geared together and driven by a single power unit. Below the cement operating bin is located an automatic cement meter which determines and gives the inspector control of the exact amount which is to go into each batch. The storage capacity of the several bins totals 2,060 barrels. At each of the two concrete plants there are two mixers. A two-way chute is installed so that the cement, after being automatically weighed or batched, may be discharged first into the receiving hopper of one mixer and then into the other. The chutes are so arranged that the cement flows around the gravel and there is practically no cement dust.

The cleanliness of the entire transportation and receiving operation from the mill to the concrete mixer is unusual and laboratory tests by the Port Authority engineers have showed that there is no loss of powder from the cement in handling it in bulk.

Paver Poured Long Culvert

(Continued from page 16)

the channel and trimmed with a tractor and bulldozer. The bucket was removed from the boom on the mixer, the boom extended with timbers, and a chute hung on the boom with a swivel on the end to place the concrete where desired. This greatly lessened the moving of the mixer.

Aggregates were hauled about 12 miles from the sand pit and slag crusher, and cement was hauled direct from the cement mill. A batching plant with a novel method of charging the batcher was set up for the two small culverts. Advantage was taken of a steep grade adjacent to the work, and the bin was set into the bank as low as possible. A Burch conveyor was used to elevate the sand and slag from a hopper in which the trucks could dump to the compartments for batching by volume into the batch trucks.

The cement platform was situated in such a manner that the batch trucks pulling away from the Erie AggreMeter could drive alongside and receive the amount of cement required for each batch.

When the 3,900-foot culvert was ready for concrete, the batch plant had to be moved and there not being a steep bank handy, an Erie ¾-yard steam crane was used to keep the AggreMeter charged with materials.

PROTECTION

During December, it was necessary to place salamanders inside the culvert to aid in the setting of the concrete and to prevent any danger from frost. The last of the concrete was poured in the main culvert on December 29, 1931, which is unusual without considerably more preparation for heating the aggregates and keeping the concrete warm after placing. On frosty nights the top slab was covered with a double thickness of heavy burlap.

WATER SUPPLY

Water for the concrete work was taken from city hydrants at convenient locations and passed through 2-inch iron pipe direct to the mixer. The pipe was laid along the top of the culvert as shown in one of the illustrations.

PERSONNEL

This work was done under the supervision of Fred R. Williams, County Surveyor, with J. C. Gallup in charge of the layout work in the field. The contractor was the Loesch & Green Construction Co., Cleveland, Ohio, with Ernest M. Green as General Superintendent, Howard H. Green as Superintendent of the mixer gang, and Irving R. Lewis as Superintendent of the carpenter work and the placing of steel.

How the Other Fellow Did It

Construction Briefs

Keep the "Mud" Clean

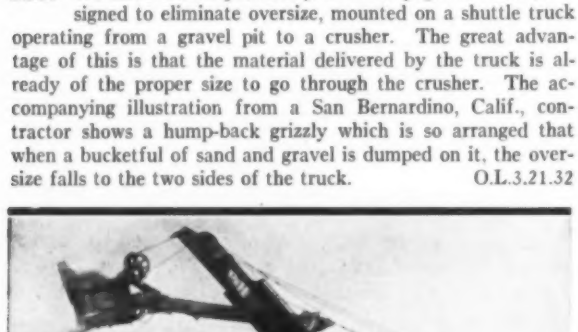
157. Many contractors refer to the concrete freshly poured on the road as "the mud" which is worked and spread by the pit men. Many cases of lack of inspection and carelessness on the part of contractors have been noticed where men who were walking around outside of the forms and had gathered up considerable dirt and real mud on their feet waded into the concrete when reinforcing fabric was to be placed. We noted in Pennsylvania that one contractor was almost fanatic about this and never permitted his pit men who wore rubber boots to step out of the mud until they came out for good at the end of their work and none of the men working on the subgrade were permitted under any conditions to get into the concrete. On this particular job when the fabric was taken from the shoulder, four men did the trick. The two inside men were pit men with rubber boots and the two outside men in each case were the subgrade men who were not in rubber boots. The work was handled quickly, the fabric placed accurately and no lumps of earth got into the slab to weaken it or to be shoveled out if discovered by a keen eyed inspector. 22.1.65

The Straight-Edge in Bituminous Construction

158. Because concrete is a distinctly plastic material as placed on the road, the 10-foot straight-edge has come to be the measure of effectiveness of the finishing operation. There is no reason why the straight-edge should not be used similarly in bituminous construction. In Pennsylvania, a forward looking contractor used an 18-foot straight-edge longitudinally on the road to show up any depressions or high spots which were filled or removed by hand. This straight-edge was also a contour board, the other edge being cut to give the exact cross-section of the road. 22.5.56

Hump-Back Grizzly Mounted on Truck

159. We have shown previously in these pages a device, designed to eliminate oversize, mounted on a shuttle truck operating from a gravel pit to a crusher. The great advantage of this is that the material delivered by the truck is already of the proper size to go through the crusher. The accompanying illustration from a San Bernardino, Calif., contractor shows a hump-back grizzly which is so arranged that when a bucketful of sand and gravel is dumped on it, the oversize falls to the two sides of the truck. O.L.3.21.32



Loading a Truck Equipped with a Hump-Back Grizzly

Batch Hauling with Contractor-Owned and Hired Trucks

160. The average haul for batches on a concrete paving job is a little under 3 miles and because of this it would not seem advisable for an ordinary contractor to own sufficient hauling equipment to supply the full requirements of the mixer on hauls of more than about 3 miles. Under ordinary operating conditions, with an average round-trip speed of 20 miles per hour and a 1-minute mixing specification, a 3-mile haul would require about 18 one-batch, 11 two-batch, 8 three-batch or 7 four-batch trucks. On the first part of a 6-mile haul, assuming no increase in average speed, this plan would involve the hiring of 3 four-batch, 5 three-batch, 7 two-batch or 14 one-batch trucks, each hired truck to be released when no longer required. In order to insure getting these extra trucks when needed, and maintaining full authority over the control of the drivers, it is best for the contractor to pay a little above the prevailing rental, but this item should not equal the carrying cost of owning these vehicles during the long period when they would not be needed on the job. 22.6.59

Handling Basement Excavation

161. A California contractor was faced with the problem of deepening a building basement from 6 to 12 feet. In these cramped quarters he could not possibly operate a power shovel so he installed two tractors. One with a rotary scraper moved the loosened material to the boot of a bucket elevator which was operated from the street floor by the other tractor through a power take-off. A truck in the street received the dirt directly from the bucket. 23.1.88

Spreading the Sand Binder on Penetration Macadam

162. A Massachusetts contractor found that the elimination of hand labor in the casting of the sand binder on the bottom course of coarse stone and of the ¾-inch chips on the penetrated top course of a bituminous macadam contract gave him a much better job with more uniform results. Sand and chip spreaders have been used effectively for covering large areas of highway which have been treated with tar or oil and for sanding icy pavements. This contractor reasoned that the same device might well be used to spread the sand and chips on his 6-mile macadam job. When the bottom course had been completed in one section and it was time to bind it with sand, a mechanical spreader was attached to one of the trucks. In a few minutes' time, the machine and truck had done the work of about six men much more effectively and quickly than the mere human machines could have completed it. The same machine was used to spread the ¾-inch stone to fill the voids after penetration and the pea stone on the seal coat. Compare this with the three or four spreader men you usually see chasing the asphalt truck as it applies the asphalt penetration and recall how much touching up has to be done as the men cannot possibly cover the surface evenly with the chips. They have to go back and recast here and there while the roller patiently waits in the background until they are through before it can start compacting and interlocking the stone with the asphalt binder. With the spreader, according to this contractor, it was possible to start the roller down the strip penetrated immediately after the truck of chips had followed the asphalt truck. 22.3.56

The Editor Comments—

Signs of the Roadside

Except in a few states the beauty of the roadsides is greatly marred by the predominance of roadside signs. As one travels over mile after mile of road there are some signs that stick in the memory because of some unusual appeal. At this writing I am 1,796 miles* along on a circuit trip through the southern states and they are no exception in producing amusing signs.

On a bridge not far from Annapolis, Md., I read this sign that offers an idea for office or shop, home or store:

NO CRABBING ON THIS BRIDGE

One that has a sinister ring, but which brought a smile to me and I think to others who have any sense of humor:

AMES FUNERAL HOME
TRY OUR SERVICE ONCE — YOU WILL APPRECIATE IT

I wondered whether that applied to the principal participant in the event, and how could one personally use the service more than once?

A sign in front of a ramshackle roadside stand had a great appeal. A man, no doubt the owner, was sitting in a chair that threatened to collapse leaning against the front of the shack. The sign?

JIM 'S INN

and it was a sin to have anything like that stand in existence. No stranger would patronize it. But then perhaps no one was expected to without the pass word.

And then the best of all was a sign along the road between Wilmington, Del., and Elkton, Md., which read:

MAKE HAY WHILE IT RAINS

That chap is an optimist, but he makes it work by a special machine that dries out the grass artificially, though it may not put the Vitamin D's into the final product as well as Old Sol himself. Who knows, perhaps it's toasted. But take that sign seriously. The present year is not one of sunshine in the business line, but there are some who are making hay right along. That does not mean that they are making money, but they are creating good will, and what is more valuable to the American business man than good will? On it credit is based and future business secured. What are you doing to "Make Hay While It Rains"?

A Better Business Blurb

It has been the style for each and every big business man since the original Hoover Commission on the condition of business to say something optimistic and big-hearted about the fine business that is just around the corner, or about the dog that is running out of the woods. We used that one ourselves and honestly believed it, though we are far from considering ourselves as "big business".

There seems to be a conviction in the dry southern states that if prohibition is done away with that there will be enough jobs created to start this country on the way to prosperity. Of course, that idea is preposterous. Just the jobs which harvesting of the necessary crops, the trucking, shipping by freight and the brewing would create would of themselves not be enough to start things going. But what under the sun is all this depression anyway but a matter of mental condition of a lot of ordinarily sensible people. After all, beer, though I don't like the stuff personally, may be the very thing that will swing enough people into thinking that business is better so that it will be stimulated, not by the beer directly, but by the thought that a new industry has been created, or an old one recreated.

Now there seems to be another and rather important thought that is growing right in the South and Middle West which will no doubt mean better business. For three years the rainfall has been far below normal and now with the spring rains up to scratch there seems to be hope that the crops throughout the country will be much better and that in itself will be a help toward stimulating business. The tobacco industry seems to be feeling hopeful for the small farmers who grow the large part of the tobacco that eventually finds its way into the Big Name brands of cigarettes as they are finding the ground conditions particularly favorable. If the small farmer can begin to purchase again in larger quantities then industry in general will be stimulated.

A news release from one of the motor truck companies in Detroit has just reached me from my office in New York and the president of that company has traveled exactly 10,000 miles on a trip that included practically every important city on the Pacific coast from San Diego to Vancouver. He reports that they are expecting big things for the immediate future (that must apply to the Northern end of the coast, for what Californian could see anything but big things right ahead) but, the motor truck company president reports, "They are practically unanimous in the opinion that we are now definitely on the up-grade. Their optimism is further encouraged by anticipation of the rich and generous crops this year that are practically assured by the unusual amount of rainfall and generally favorable weather conditions." The south and west seem to be in accord on the crop situation and here's hoping that they are both right!

Theodore Reed Kendall

* 5,318 miles completed May 31, 1932.

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

Silence and the Law

Badly astray will go the contractor who learns the law of his business from classical adages. Take, for example, John Boyle O'Reilly's assurance, "Silence never betrays you," or Carlyle's more familiar saying that "Silence is golden." Both are dangerous if they be accepted as bits of legal advice. There is a more practical maxim in the Law, "He who fails to speak when he should will not be heard to speak when he would."

The most common instance of "sewing oneself up" by remaining mute is to receive statements of account and delay challenging their correctness. It is well settled law that one who receives a statement of an account on which he is indebted and fails, without reasonable excuse, to object to the bill as being incorrect within a reasonable time, by his silence says, "Your bill is O. K. and I'll pay it." It thereby becomes what is known as an "account stated," and the creditor may recover on mere proof of rendition of the statement and its retention, without objection, by the debtor. The consideration for the indebtedness need not be proved.

So, too, if one stands by and permits some one else to deal with his property as his own, he will be precluded from afterwards denying that the ostensible owner was the real owner.

But the rule of the effect of silence is applied by the courts with reason and justice, and it is not always that silence binds the person who stands mute. To illustrate, if A writes an offer to B to do or sell something, he cannot bind B by saying, "If you do not advise to the contrary, I'll assume that you accept." B cannot be thus required to express himself under pain of being regarded as accepting the offer, if he remains silent.

Right to Avoid Releases

"When I sign this release, I'm kissing good bye all hope of ever getting one cent more than it calls for. And, if I am ever going to know what I am signing, now is the time to know it."

If every contractor would say that to himself before signing any sort of a release, he would be more cautious than many laymen who, to their sorrow, have failed to do it.

There is no reason why any one who signs a release and delivers it can expect it to be something that can be pulled back like a ball attached to an elastic cord.

Let the reader take warning by what the Iowa Supreme Court very lately said in the case of Crum v. McCollum, 233 N. W. 678, in laying down a rule that applies to signing contracts in general, as well as releases:

"It is a well-recognized rule of law . . . that, if a party is able to read and has the opportunity to do so, but omits this precaution because of false statements by the adversary as to the contents of the instrument, his negligence in failing to read the instrument will estop him from claiming that the instrument is not binding."

The court further observed that the mere fact that one who has signed a release later discovers that it was executed for a consideration less than what later proves to be adequate compensation for the right released affords no just ground for setting aside the instrument of release.

Dealing With Friend Husband

The contractor or material dealer, who furnishes work or materials on a married woman's property on the order of the husband, and who assumes that because the husband and wife are "one" in a sentimental sense, it is a "lead-pipe cinch" that the wife will have to pay, regardless of whether she has been consulted, had better wake up to the true state of the law.

As a matter of fact Friend Husband has no more right to bind his wife in such transactions without her assent than he would have to assume to act as agent for his neighbor's wife without being so authorized. To hold the wife liable, there must be some evidence showing that, by word or act, she authorized pledging of her credit, or ratified the transaction after learning of it.

In the case of Hall v. Collins, 154 S. E. 723, decided by the Georgia Court of Appeals September 6, 1930, that court said:

"In this suit against a married woman to recover the purchase price of building materials, where there was evidence to show that the defendant and her husband discussed the matter of the construction of a house upon her land before any materials were bought, that the wife consented to the building of such house, and thereafter knew that the husband was buying from the plaintiff certain materials to be used therein, while the wife in her own behalf purchased other materials from other parties, that the husband in making the purchase from the plaintiff claimed and purported to be acting as the agent of his wife, informing the plaintiff that the lot upon which the house was to be erected was her property, and that after the furnishing of the materials the wife promised the plaintiff that she would give her note for the debt or would place a loan upon the property for the purpose of raising money with which her husband could pay it, a finding in favor of the plaintiff and against the defendant wife as the real debtor was not without evidence to support it, and cannot be set aside by this court as being unauthorized as a matter of law."

Proving Materialman's Right to Recover on Bond

The courts do not take much as granted. Ordinarily anyone who asserts a legal right must clearly establish the facts on which he relies. But when the circumstances are such as to reasonably permit the court in indulging in a presumption of fact, the presumption may take the place of specific proof of the fact presumed. The point is illustrated by the opinion handed down by the New Jersey Supreme Court August 14, 1930, in the case of Core Joint Concrete Pipe Co. v. Standard Accidental Insurance Co., 151 Atl. 470. That was a case where plaintiff sued on a bond securing payment for materials on a public sewer job. Deciding the controversy in favor of the materialman, the court said:

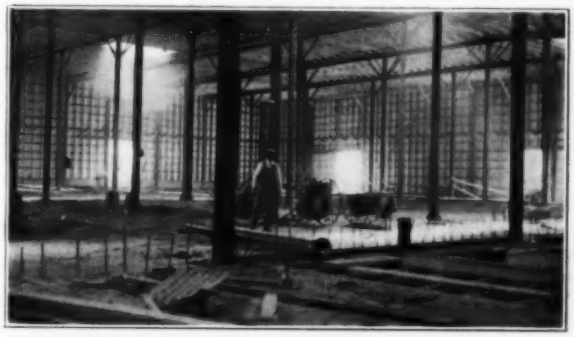
"Defendant first contends that the evidence presented by the plaintiff has not properly proved the delivery of the materials to the job. The evidence does, however, show that the materials were duly delivered at the site of the construction to a proper person in charge of the work; and, inasmuch as the construction could not have progressed, is proved that they were used for the purpose for which they were delivered."

The Consulting Engineer

Various Projects of Texas Engineers

AMONG the various projects under way or recently completed by the office of the ENGINEERING SERVICE CORP., Houston, Texas, are a tonnage survey for the Louisiana-Texas Waterways Corp., showing the available tonnage, cost of barges and tow boats, operating costs and probable income from barges to be operated on the Intracoastal Canal between New Orleans, Lake Charles, Orange, Port Arthur, Galveston, Houston and Corpus Christi, which line is now in operation between New Orleans and Beaumont; preparation of plans and the supervision of construction of a gasoline distribution terminal for the Pioneer Terminal Co. on the Houston Ship Channel, consisting of four 1,500-barrel tanks, pump and other equipment for handling gasoline from barges to tank cars or trucks; and the preparation of preliminary reports and estimates of the cost of construction and operation of two proposed oil pipe lines from the Texas fields to terminals on the Houston Ship Channel, including pipe lines, pumping stations, tank farms, terminals and docks.

This company also prepared the plans and specifications and supervised the construction of a canal, turning basin, dock and conveyor system for the Avery Salt Co., at Avery Island, La. This work consisted of 3½ miles of 9 x 40-foot canal, a turning basin for handling tow boats and barges and a dock and conveyor system for handling the salt products from the plant to barges which are to operate on the Intracoastal Canal. This project gives water transportation from the Avery plant to all points on the Mississippi and Ohio Rivers. Another project is a warehouse located at Houston, Texas, for Mente & Co., Inc., of New Orleans, plans and specifications for which were prepared by this firm. This warehouse covers 45,000 square feet, is 24 feet high in the clear and is of steel and wood frame and corrugated iron construction. The construction of this building was carried out by the owners, under the supervision of the Engineering Service Corp., with Ben I. Still as Resident Engineer and M. F. McCracken, General Superintendent.



Interior of the Mente & Co. Warehouse at Houston, Texas, Under Construction

Consulting Briefs

Jerry Donohue Engineering Co., 608 N. 8th St., Sheboygan, Wis., are preparing plans for a water and sewer system for the Village of Campbellsport, Wis., for which a $60,000 bond issue was voted, and for a sewage disposal system and collecting sewers for the Village of Kohler, Wis., for which a bond issue of $100,000 was voted.

Hawley Freese & Nichols, 407 Capps Bldg., Ft. Worth, Texas, are making appraisals of properties of the Lone Star Gas Co., for the Railroad Commission of Texas, the Community Natural Gas Co. for Royse City, Texas, and of the McLean Gas Co., McLean, Texas. The construction of a filtration plant for Chickasha, Okla., and of Eagle Mountain Dam, Ft. Worth, Texas, is going on under this firm's supervision. George W. Smith, Paul Wright and A. G. Maddren have recently joined the staff.

Isaac S. Walker, Consulting Engineer, has announced the removal of his offices from 750 Drexel Building to 629 Chestnut St., Philadelphia, Penna. Mr. Walker specializes in water supply and purification, sewerage and sewage disposal, examinations, reports, design and construction as well as devoting especial attention to the appraisals of utility properties, rate investigations and expert testimony.

G. J. Wagner & Co., 303 Home State Bank Bldg., Grand Rapids, Mich., report that they now have a staff of 45 men which is about 15 more than their customary staff, on account of a large amount of appraisal work for the Michigan Public Utilities Commission. Other work going on in this office includes the preparation of a gas case for Pontiac, Mich., an appraisal of electrical properties in Tennessee and the completion of a gas arbitration case in Saginaw, Mich. They are acting as expert witnesses in the Michigan Bell Telephone Co. case and in the Saginaw gas arbitration case.

Pate Hamann & Hirn, 1610 Washington Blvd. Bldg., Detroit, Mich., are preparing reports on relief sewers for the City of Lincoln Park, Mich., and on the assessable value of property in the Village of Riverview, Mich. They are serving as expert witnesses in the Munn & Muntz vs. White Chapel Memorial Park Association controversy concerning a lawn sprinkling system covering 75 acres.

Charles Brossman Engineers, Chamber of Commerce Bldg., Indianapolis, Ind., are preparing plans for a sewage disposal plant for Berne, Ind., a new boiler plant, filter plant and miscellaneous equipment for St. Meinrad's Abbey, St. Meinrad, Ind., and for a water filtration plant at Turkey Run Park for the State Department of Conservation of Indiana. The construction of a new electric and gas-engine-driven pump for Auburn, Ind., complete water filtration and pumping plants for Peru and Paoli, Ind., a complete sewage disposal plant for Butlerville, Ind., and water mains extensions and a new 500,000-gallon elevated tank for Valparaiso, Ind., is being carried on under the supervision of this firm.

Who's Who in Construction

A Series of Reports from Active Contractors

BUS. VOLUME—ANNUAL VOLUME OF CONTRACTS
A—Over $5,000,000
B—Between $1,000,000 and $5,000,000
C—Between $500,000 and $1,000,000
D—Between $250,000 and $500,000
E—Under $250,000

The Edw. Gillen Dock, Dredge & Construction Co., Beardstown, Ill., First State Bank Bldg. Branch offices: Racine, Wis., and Havana, Ill. Organized: 1905. Bus. vol. E. The original partnership was of Knapp and Gillen dating shortly after the Civil War. It was incorporated in 1905 under the laws of the State of Wisconsin. Officers: F. P. Gillen, President and General Manager; M. J. Knoblock, Vice President; F. H. Gillen, Secretary, and C. A. Gillen, Treasurer. Major contracts: 1928, Banner Special Drainage and Levee District, Fulton County, Ill., E. Liverpool Drainage and Levee District, Fulton County, Ill., Lacey Drainage and Levee District, Fulton County, Ill.; 1929, E. Liverpool Drainage as in 1928, Copperas Creek Lock Road, Fulton County, Ill., State Highway Department, Route 98, Section 112A, Fulton County, Ill., Highway Department.

F. P. Gillen
President

The Stone Construction Co., Columbus, Ohio. 452 S. Pearl St. Organized: 1920. Bus. vol. D. 1919-1920, partnership. In 1920 incorporated as the Crowell & Stone Co. Reorganization and change of name to The Stone Construction Co. took place in 1925. This company specializes in bituminous road and street construction and asphalt, tar and road oil application. Officers: Frank R. Main, President; W. C. Dickey, Vice President and General Manager; I. H. DeRolph, Secretary and Treasurer. Major contracts: 1928, for the Indiana State Highway Commission, contracts amounting to 22 miles; 1929, for the Indiana State Highway Commission contracts amounting to 13 miles; 1930, contract for the Ohio State Highway Department, 18 miles, and two contracts for the Indiana State Highway Commission, 22 miles; 1931, contract for the Ohio State Highway Department, 18 miles and for the Kentucky Highway Department, 11 miles. Member: Indiana Highway Constructors Association and A. G. C. of A.

Myers Bros., Los Angeles, Calif., 3407 San Fernando Road. Organized: 1918. Bus. vol. B. In 1918 J. A. Myers, the father of the present Myers Brothers, retired and the name of the firm was changed to Myers Bros., the company passing to Ray A. and John H. Myers. On December 25, 1930, John H. Myers, the junior member of the firm, met accidental death, leaving the firm under the management of Ray A. Myers, the surviving partner, who is continuing the business under the same name and style of Myers Bros. Major contracts: Multicolor Laboratory, $1,500,000; R. K. O. sound stage, $610,000; Richfield Beacon stations, $200,000; Universal Pictures sound stages, $300,000; Morgan Laundry, $50,000; Magnolia Christian Church, $75,000; St. Paul Presbyterian Church, $67,000; Ruppe Mortuary, $75,000; R. K. O. dressing room building, $150,000; R. K. O. property building, $225,000 and Standard Oil Co. stations, $150,000.

Victor A. Pyles Co., Inc., Brooklyn, Md., 527 Chesapeake Ave. Organized: 1930. Bus. vol. E. This company was organized in 1922 as Stoll & Pyles, Inc., and in 1925 was taken over by Victor A. Pyles and operated as Victor A. Pyles & Co. It was incorporated in 1930. Officers: Victor A. Pyles, President and Treasurer; Walter M. Henritze, Vice President; Vincent G. Meyd, Secretary. Major contracts: 1929, parking area, roads, sidewalks, curbs, sewage disposal plant, sludge digestion tank at Middle River, Md., $67,640, athletic field at Roland Park, Baltimore, Md., $12,000; 1930, concrete and earthen firewalls for the Texas Co. at East Brooklyn, Md., $30,842; flying field office, drainage, roadway and seaplane ramp at Middle River, Md., $25,200, highway bridge over Pennsylvania Railroad at Lanham, Md., $70,000; 1931, improvements of grounds at Fort McHenry, Baltimore, Md., for the United States Government, $42,000. Member: Associated General Contractors of America.

K. C. Wilson, Shreveport, La., Box 549. Organized: 1928. Bus. vol. C. K. C. Wilson, the sole owner, was formerly a partner in the Glassell-Wilson Co. He started operations in his own name in 1928. Major contracts: Market Street Viaduct, $400,000, filtration plant, $370,000, Big Chain community center, $110,000, remodeling Washington-Youree Hotel, $200,000, dormitory, Dodd College, $105,000, laundry building, $120,000, all in Shreveport. Member: A. G. C. Mr. Wilson is President of the Shreveport Chapter.

Kuchar Brothers, Montvale, N. J., Franklin Ave. Organized: 1921. Bus. vol. D. Officers: Frank M. Kuchar, President; Miles S. Kuchar, Vice President; Joseph J. Kuchar, Secretary, Treasurer and Manager. Major contracts: 1928, two bridges in Passaic County, N. J., and a dam at Sharon, Conn.; 1929, sewage disposal plant and pumping station at Delmar, N. Y., and water supply system at Rockland State Hospital, Orangeburg, N. Y.; 1930, sewage disposal plant and five pumping stations at East Paterson, N. J.; State Highway bridge at Fairview, N. J.

Gust D. Forssen, Missoula, Mont., 221 E. Main Street. Branch offices: Glasgow and Anaconda. Organized: 1917. Bus. vol. D. Officers: Gust D. Forssen, Manager; Carl G. Forssen, Asst. Manager and Director; John A. Forssen, Director. Major contracts: 1927, Junior High School, Anaconda, Mont., $230,000; 1928, Junior High School, Glasgow, Mont., $170,000; 1929, Firestone Building, Missoula, Mont., $55,000; 1930, theatre, Anaconda, Mont., $125,000. Member: Chamber of Commerce and Local Contractors Association.

Breeden Bros. Construction Co., Springfield, Ill., 1134 W. Monroe Street. Branch office: Jacksonville, Ill. Organized: 1928. Bus. vol. E. In 1927 this company was organized under the name of C. F. Breeden Co. and early in 1928 was reorganized under the name of Breeden Bros. Construction Co. Officers: C. F. Breeden, Manager and Engineer, P. H. Breeden, Superintendent. Major contracts: 1929, LaSalle County subway, $35,000; 1930, Marion County subway and paving, $65,000; 1931, Clay County paving, $20,000; Crawford County paving, $15,000; Morgan County paving, $10,000.

Construction Industry News

Austin Manufacturing Co., Chicago, Ill., has announced the election of S. F. Beatty as President of the company. Mr. Beatty is well known as the President of the Austin-Western Road Machinery Co., and of the Road Machinery Manufacturers Association as well as for his many years of service as an officer and director of the American Road Builders Association. W. T. Beatty, for many years President and General Manager of the Austin Manufacturing Co., has been elected Chairman of the Board and K. N. Forbes has been elected Vice President.

Traylor Engineering & Manufacturing Co., Allentown, Penna., has moved its Chicago office from 1414 Fisher Building to the One LaSalle Street Building. Benard Haislip, former District Manager, has resigned and is succeeded by D. A. Cheyette.

American Steel & Wire Co., Chicago, Ill., has announced the opening of its new warehouse at 2364 South Ashland Ave., Chicago. The main office is at 208 So. La Salle St.

Wickwire Spencer Steel Co., New York City, has recently been licensed to manufacture preformed wire rope under the patents of the American Cable Co.

Sterling Motor Truck Co., Milwaukee, Wis., has reported that the month of April closed with more unfilled orders than any other similar period since the spring of 1930. Over $100,000 worth of orders were closed on April 30 alone, making it the largest single day's sales since April, 1929.

Construction Machinery Co., Waterloo, Iowa, has been purchased by Philip L. Bryant, President of the Bryant Paving Co. Operation of the factory will start immediately and the company will continue under the name of the Construction Machinery Co. Mr. Bryant, who is President of the new firm, will be in active charge, with Laura B. Bryant as Vice President and L. S. Holden, Secretary-Treasurer.

Blaw-Knox Co., Pittsburgh, Penna., has announced the appointment of Merrill G. Baker as Executive Assistant to Albert C. Lehman, President of the company. For several years Mr. Baker was associated with Ford, Bacon & Davis, Engineers, of New York City, in the capacity of assistant to the vice president.

1931 Highway Costs in Minnesota

UNIT prices on every class of highway construction in Minnesota were substantially lower in 1931 than in 1930 and previous years. Average prices on some of the principal items were as follows:

	1930	1931
Paving, except cement, per square yard	$1.302	$1.252
Cement for paving, per square yard	.622	.466
Net per square yard, slab only	$1.924	$1.718
Grading excavation per cubic yard, including overhaul	.296	.248
Bridges, per linear foot	$181.70	$160.286
Gravel surfacing, per cubic yard	$1.003	$0.837

The average cost per mile for concrete paving, 20 feet wide, dropped from $25,508 in 1930 to $22,920 in 1931. This includes shouldering, curbs, drains and all miscellaneous items. The average cost of grading dropped from $10,621 per mile in 1930 to $8,608 in 1931. When right-of-way culverts, bridges and miscellaneous structures are included, the average per mile was $17,376 in 1930 and $14,972 in 1931.

The drop in gravel costs is greater than the cost per yard would indicate, since the average haul increased from 4.22 miles in 1930 to 4.78 miles in 1931. The average cost per mile dropped from $1,602 in 1930 to $757 in 1931, partly due to lower prices and partly to a decrease from 1,598 cubic yards per mile in 1930 to an average application of 904 cubic yards on roads graveled in 1931. Less gravel is used because paving or bituminous treatment now follows closer after the grading and graveling.

The average cost per mile of new bituminous treatment dropped from $1,590 in 1930 to $1,307 in 1931, and the average cost of retreatments from $793 in 1930 to $761 in 1931.

Improved machinery, keen competition between material producers, buying in larger quantities and general business conditions combined to bring prices down. C. M. Babcock, Commissioner of Highways, states that when business conditions return to normal, there may be some increase in prices, but more efficient machinery will probably keep costs down below the unit prices of 1930 and preceding years. State Highway Departments are not only getting needed improvements at low prices but road work is furnishing employment to thousands of people who need it. Investing money in good roads now will bring dividends for many decades.

Building an Underpass on the C. N. R.

(*Continued from page 26*)

continuous pour.

The slabs were cured with a covering of sawdust to a thickness of about 2 inches which was kept wet for 10 days. The slabs, as will be seen by the illustrations, were well reinforced with a large number of 1¼-inch steel bars running the length of the slab and every one bent to develop the maximum strength in the slab. When pouring of a section of slab was under way three buggies were used.

The Labor Organization

The contractor's labor organization consisted of: one man in the cars while the aggregate was being unloaded, one derrick man and a fireman on the boiler for the steam hoist of the derrick, two men handling cement to the bucket elevator (on off days these same men unloaded cement from the cars to the cement house), one man batching sand and gravel, one man batching cement, one engineer for each of the gasoline locomotives, one man riding each full train out to the dump and also on the concrete hopper controlling the delivery to the trains; then on the receiving end for placing the concrete there were two hopper men loading the buckets at the bottoms of the wood chutes, one crane operator, two men on the steel hopper receiving the concrete for loading the buggies, three buggy men, two shovelers, one man watching steel, and one man spading, and a foreman.

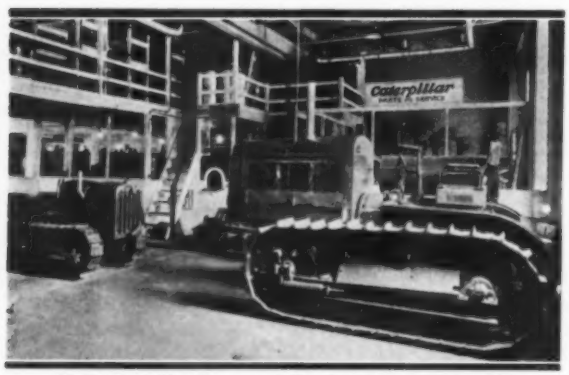
The contractor used pipe stands and railway rails for supporting the runways over the forms being poured.

Personnel

The contract for the Richmond Street and the Wellington Street subways was awarded to the W. H. Yates Construction Co., Ltd., of Hamilton, Ontario, for which J. Fentie was Superintendent. The work was in charge of R. A. Baldwin, Engineer of Construction for the Canadian National Railways, with S. G. Smith as Resident Engineer.

The Equipment Distributor

Caterpillar Tractor Co., Peoria, Ill., has announced the following new Caterpillar dealers: Western Motors, Ltd., Brandon, Manitoba, Can.; Stouffer Tractor & Equipment Co., Harrisburg, Pa.; Jack Neal Sales Co., San Antonio, Texas; Syracuse Supply Co., Syracuse, N. Y.; Hunter Machinery Co., Milwaukee and Madison, Wis.; John East Iron Works, Ltd., Saskatoon, Sask., Can.; Rio Grande Hardware & Machinery Co., Harlingen, Texas; Bert Smith Road Machinery Co., Enid, Okla.; Georgalina Tractor Co., Augusta, Ga.; Tractors & Equipment, Ltd., Frederickton, N. B., Can.; Grand Forks Tractor & Equipment Co., Grand Forks, N. D.; Gleason Motor Car Co., Shamokin, Pa.; Smith Tractor & Equipment Co., Irvington, N. J.; Flowers Tractor & Equipment Co., Omaha, Nebr.; Cliff Miller Tractor & Equipment Co., Council Bluffs, Iowa; Spring Grove Tractor & Equipment Co., Cincinnati, Ohio; Jarvis-Tull Tractor & Equipment Co., Plainview, Texas; F. Rendon & Hermano, Nuevo Laredo, Tamps, Mexico; Quiney Tractor Co., Quiney, Ill.; and W. T. Walsh Equipment Co., Cleveland, Ohio.



The Caterpillar Parts and Service Department of the Hunter Machinery Co., Milwaukee, Wis.

Harry C. Collins Machinery Co., Los Angeles, Calif., has been appointed distributor in the Los Angeles and adjacent territory for the shovel and crane division of the Link-Belt Co., Chicago. Mr. Collins has had 25 years' experience in handling all types of contractors' equipment.

Great Northern Tool & Supply Co., Billings, Mont., has recently been appointed distributor for the Lincoln Electric Co. Stable-Arc welders, welding supplies and Lineweld motors for the territory of Montana and Northern Wyoming.

Paul Cochran Equipment Co., formerly located at 310 So. Michigan Ave., Chicago, Ill., has recently moved to a new location, 228 N. LaSalle St. In addition to its other lines, this company is now distributor for the Thew Shovel Co., Universal Crane Co. and the Worthington Pump & Machinery Co.

Tulley Equipment Co., Inc., has recently moved from its old quarters at 1011 Russell Blvd., St. Louis, Mo., to 4215 Clayton Ave., and will continue to carry the same complete line of equipment as herefore.

Keller Tractor & Shovel Co., Inc., of Detroit, Mich., wishes to announce that it has recently changed its name to **Keller Tractor & Equipment Co.** and that it has changed its address from 5124-70 Braden Ave. to 5163-69 Martin Ave. This company has taken over the business and property of the Contractors' Equipment Co. of Detroit, Mich., which permits the expansion and acquisition of new lines of road building equipment and machinery. Tom Abrams, for ten years well known in the distribution of contractors' equipment in Michigan, has joined the Keller organization in the capacity of Sales Manager.

McDonald Tractor Co., Orlando, Fla., has recently been appointed distributor for the complete line of construction equipment manufactured by the Chain Belt Co., Milwaukee, Wis.

J. Frank Rollings of Cleveland, Ohio, announces that he has moved from 1337 Schofield Bldg., to 2215 West Boulevard, where he will continue to carry a line of contractors' equipment.

Burgman Tractor Equipment Co., Jacksonville, Fla., has recently been appointed by the Chain Belt Co., Milwaukee, Wis., as distributor for its complete line of Moto-mixers, central mixing plants, pavers, concrete mixers, plaster and mortar mixers, pumps, saw rigs and other construction equipment.

Distributors' Bulletin Board

The distributors of construction equipment listed below have made changes this month in their cards appearing in the Distributors' Directory on pages 59 to 80 of this issue of CONTRACTORS AND ENGINEERS MONTHLY:

Alban Tractor Co., Inc., Baltimore, Md.
J. W. Bartholow Co., Dallas, Texas
Borchert-Ingersoll, Inc., St. Paul, Minn.
Carolina Contractors Equipment & Supply Co., Columbia, S. C.
Paul Cochran Equipment Co., Chicago, Ill.
Forsythe Brothers, Long Island City, N. Y.
Johnson & Dealaman, Inc., Newark, N. J.
The Wm. T. Johnston Co., Cincinnati, Ohio
Keller Tractor & Equipment Co., Inc., Detroit, Mich.
W. A. Kuhlman & Co., Toledo, Ohio
Nixon-Hasselle Co., Chattanooga, Tenn.
Northern Road Equipment Co., Portland, Maine
Henry A. Petter Supply Co., Paducah, Ky.
P. I. Perkins Co., Boston, Mass.
Raleigh Tractor & Equipment Co., Rapid City, S. D.
J. Frank Rollings, Cleveland, Ohio
Tulley Equipment Co., Inc., St. Louis, Mo.
The W. T. Walsh Equipment Co., Cleveland, O.

A Preview

"One measure of the ability of a contractor to handle his work satisfactorily is the number of new devices he develops himself to make the work easier, speedier or more accurate. . . . The Central Engineering Co. job running north from Ainsworth, in the southeastern section of Iowa, was filled with novel devices that helped the contractor in many ways." . . . A preview of the opening article scheduled for the July issue of CONTRACTORS AND ENGINEERS MONTHLY.

The New Galion Hydraulic Hoist

A Heavy-Duty Hydraulic Hoist

A RUGGED powerful hydraulic hoist with a heavy-duty 6-inch cylinder, with low oil pressure, has recently been announced by the Galion Allsteel Body Co., Galion, Ohio. The oversized cylinder is carefully reamed and honed, and is fitted with a heavy cast semi-steel piston, and steel piston rings. The entire assembly is simple and with few parts. High pressure pipe lines and all screwed connections have been eliminated. The hoist is completely assembled at the factory to simplify handling and mounting by users.

The subframe is a one unit type, built all of steel. The drive shaft cannot be thrown on a twist or distorted or subjected to strain, because of the self-aligning bearing which automatically adjusts and aligns the drive shaft under all conditions. The heavy-duty pump is affixed directly in the cylinder head, thus eliminating all of the high pressure pipe line connections. A full-sized 2-inch shaft is used as a pivot for the cylinder. Two full length 8 x ½-inch thrust bars further support the pivot shaft of the cylinder, tying the subframe rigidly together.

Sectional Batching Bins

SIMPLE portability in an all-steel bin, with a minimum of field bolting, is offered in the construction of the sectional bins manufactured by the C. S. Johnson Co., Champaign, Ill. They are designed to provide full capacity in a rigid design, with each of their three sections limited in size to permit handling by a small crane and to meet shipping requirements and average truck capacities.

The 30-yard size is shipped complete in two sections, the gantry or leg section and the cradle or bin bottom section. To these sections a one-piece panel section is added to provide the 50 and 70-yard sizes, while in the 100 and 129-yard sizes the panel is shipped knocked down to meet railroad shipping requirements.

The gantry section supplies a strong self-supporting base which is thoroughly braced. The cradle section is bolted to the gantry at each of the four corners and wind-braced by four angles extending from the cradle to the base. The panel section is bolted to the cradle section and provides a compact rigid unit. All sectional bins can be supplied with either two or three compartments arranged for two or three single material weigh batchers or a multiple material weigh batcher.

A New Line of Tautline Cableways

A NEW line of tautline cableways with improved features both in design and in construction has been announced by Sauerman Bros., Inc., 464 So. Clinton St., Chicago, Ill. These cableways are divided into two general types, a light-duty cableway for light loads and comparatively short spans, and a heavy-duty cableway for larger loads and longer spans. The purpose has been to provide a suitable size and type of conveying cableway for a wide range of material handling problems, including the handling of concrete on bridge and dam construction, conveying stone out of quarries in skips, canal construction, etc.

The light-duty tautline cableway is furnished in either 1 or 2-ton sizes and for spans up to 500 feet. In this cableway the carriage is of the two-wheel type with hollow-web track sheaves. The hoisting sheaves are protected with bronze bearings and pressure lubrication fittings. The tower sheaves have bronze bearings with lubrication fittings mounted on the shaft with solid boxes. All sheaves in these as well as in the larger cableways are of alloy steel.

Sauerman heavy-duty tautline cableways are built in a variety of sizes for handling loads up to 30 tons. These are furnished with three, four, six or eight-wheel carriers, depending on the capacity, and all of the sheaves are fitted with roller bearings. These cableways are provided with shock absorbing fall-rope carriers which are selectively and positively picked off the moving carriage, on the outward trip, by buttons located at fixed distances along a button rope suspended between the towers above the track cable. On the return trip of the carriage, these carriers are picked up and carried with it. These fall-rope carriers are designed to withstand the shocks of impact in high-speed operation. The buttons are of the latest improved type to assure long life and minimum damage to the button rope and at the same time to remain permanently in position in the rope.

In designing the steel towers for these cableways, there has been a radical departure from the conventional tower design so that this tower can be shipped much more completely assembled than earlier types, simplifying the problem of erection.

Hoists for Sauerman tautline cableways are of the reversible type with large diameter clutched drums for operating the hoisting lines and spooled endless cable drums for the conveying.

The New Sauerman Tautline Cableway

Benson Street, Reading, Ohio. Paved with concrete in 1923.

This 9-year test proves the merit of

Unretouched photograph showing section of above pavement around expansion joint after 9 years service.

Carey Elastite EXPANSION JOINT

When this concrete pavement was laid in 1923, it was protected against expansion and contraction stresses by Carey Elastite Expansion Joint. Being a connecting link between two important highways, as well as the main village street, it is subjected to unusually heavy traffic.

The unretouched photograph at the left, taken in March, 1932, and showing a typical pavement section surrounding one of the expansion joints, is eloquent testimony to the durability of both concrete paving and Carey Expansion Joint.

Made with felt side walls which insure *uniform* resistance, Carey Elastite Expansion Joint has for 20 years proved its value and dependability in "making good paving better."

THE PHILIP CAREY COMPANY :: Lockland, Cincinnati, Ohio

Branches in Principal Cities

BUILT-UP ROOFS
ASPHALT PRODUCTS
ELASTITE EXPANSION JOINT
WATERPROOFINGS
ROOF PAINTS

Carey PRODUCTS

HEAT INSULATIONS
ASBESTOS MATERIALS
CORRUGATED ASBESTOS SIDING
ASFALTSLATE SHINGLES
ROLL ROOFINGS

640

A New Distributor for Oil, Tar and Asphalt

A NEW line of bituminous distributors built in 600, 800, 1,000, 1,200 and 1,500-gallon capacities to handle all grades of oil, tar and asphalt and designed for mounting on any standard truck chassis has been announced by the Austin-Western Road Machinery Co., 400 N. Michigan Ave., Chicago, Ill. Mountings of these Austin units can also be made on trailers and semi-trailers.

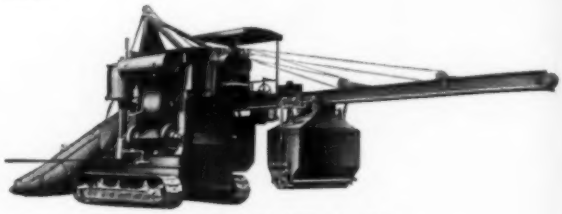
Any desired uniform quantity of bitumen per square yard may be applied over any specified width. Spray bars or manifolds of welded sheet metal construction are tapered to correspond with the reduction in volume and to provide drainage when they are removed. If preferred, a full circulating boot-type manifold, with individual nozzle shut-offs working in gang formation, can be provided. The nozzles and valve controls are inside the manifold pipe where the heat makes for immediate and complete drainage. The tanks are elliptical in shape to provide a low center of gravity, and each has a sufficient expansion zone above. All seams are electrically welded and tested under pressure for water tightness. A full size manhole with a non-breakable quick clamping lid and a 2½-inch vertical overflow are standard equipment. Asbestos lagging with a sheet metal cover can be provided.

The provision for heating includes two large double U-tube flues with generating non-carbonizing type burners which operate with kerosene or light furnace oils. Before the heat leaves the smoke stack at the front, it must pass through ten smaller flues, spaced to break up the asphalt mass into small volumes. The fuel storage and air pressure tanks have a capacity sufficient for a day's run. If steam coils are desired instead of the U-tube construction, a double set of removable coils having eight lengths of tested pipe can be furnished.

The pump is of the internal gear type, with but two moving parts, and has a capacity of 350 gallons per minute at 350 rpm. It is also equipped with a self-aligning anti-friction outboard bearing. Lubrication, grease cups and packing glands are in an accessible location. A heavy-duty and easily accessible 4-cylinder motor drives the pump. It is placed at the front of the distributor to eliminate fire hazard and to prevent the mist and fine spray of asphalt causing ignition trouble, short circuits or a clogged cooling system. The governor and gas throttle rods are extended to the rear, giving the operator complete control of the machine. The front and rear piping is assembled in an upright position to permit natural drainage and easy starting. Flanged pipe fittings and metallic tubing are included in the design to prevent leaky joints, the valves and shut-off cocks are of the inverted plug, spring loaded type, kept tight at all times by internal springs. The pump and front end fittings are fully enclosed in an asbestos covered heat chamber. The piping arrangement allows for full circulation within the tanks and a by-pass line also permits complete exterior circulation around the pump for wash-out or cleaning purposes.

These new Austin distributors are furnished with modern operating features as well as a complete line of auxiliary equipment.

A New Bituminous Distributor



The 1932 MultiFoote Paver

Features of Improved 1932 Paver

A CONSIDERABLE number of improvements and new features have been included in the 1932 MultiFoote paver recently announced by The Foote Co., Inc., Nunda, N. Y. Three tons of weight have been added to the paver, all due to increased size of parts resulting in greater rigidity and longer life. The entire MultiFoote has been speeded up starting at the loading skip, which now raises in 8½ seconds to the boom bucket which travels at increased speed.

The traction has been further strengthened and improved, the chassis has been both lengthened and widened 12 inches, giving a firm and solid foundation for the mixing and placing of concrete. The two-speed traction has been incorporated. The friction surface of the skip hoist has been increased 2 inches in width and the brake band 1 inch. The hoist gear is now a renewable cut steel ring gear of larger capacity. The larger diameter hoist drum will prolong cable life. The size of the shaft has been increased and the hoist drum is mounted on Timken bearings.

The superstructure is of entirely new design with lowered boom support and a "one-man top" for the loading skip which can be quickly lowered for shipment or to pass under viaducts. Hinged construction eliminates all bolts. The transmission has been completely stepped up in specifications, utilizing stronger materials, parts of greater size, cut steel gears, heavier shafting of automotive quality, greater accessibility, simplification of parts and is completely enclosed.

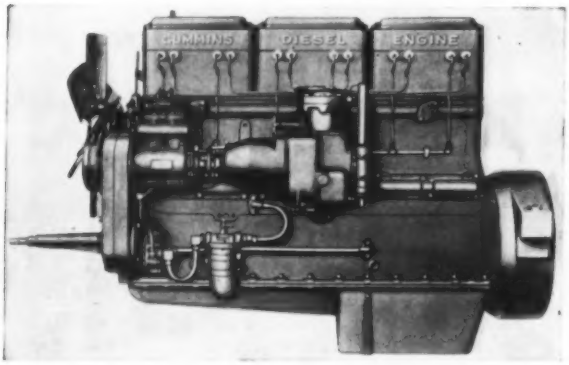
The boom which is of the standard A.G.C. length of 17 feet 6 inches can be supplied as long as 25 feet. The machine is developed and designed to carry it. The increased radius of swing saves hand shoveling. A larger cut steel worm gear is mounted above the boom pivot and runs in an oil-tight case. The bucket has been increased in size and its sides and top are roofed with sheet steel to secure greater rigidity and longer life. A Hercules heavy duty Model YXC 6-cylinder motor is the power plant for each MultiFoote paver. Rated at 74 horsepower at the normal operating speed of 1,480 rpm, it has a large surplus of power. The entire power plant side of the housing consists of hinged metal panels. It is equipped with a 75-gallon gasoline fuel tank with pump feed to the motor.

The 1932 MultiFoote paver may be secured complete with calcium chloride solution equipment or with tower hoist equipment. The hoist is used for large jobs where the concrete must be elevated and delivered over a considerable area. The boom is removed and a 12-inch channel added to the front of the paver to carry the hoist and tower from which the concrete is distributed.

A Diesel Engine for Automotive Use

A NEW diesel engine which compares in weight, size and appearance with gasoline engines and which can be used for the smaller pieces of construction equipment has been developed by the Cummins Engine Co., Columbus, Ind. Many have believed it impossible to reduce the weight of the diesel, since this type of engine was recognized as a high compression unit and required the extra strength. With the development of this diesel for automotive uses, there have also been developed a great many new materials, the result being that the new Cummins diesels compare with gasoline engines of similar displacement in weight, size and appearance. For a given power output, or a given cruising radius in automotive equipment, the weight of the diesel together with the weight of the fuel is really less than the gasoline engine.

The new Cummins diesel looks very much like a gasoline engine excepting, of course, that there are no spark plugs, carburetor or manifolding systems. The new diesels are started electrically as are other engines. Provisions are made for attaching, as complete units, electrical generators, air cleaners, oil filters and other modern accessories, including a built-in



The Cummins Model H 6-Cylinder Diesel Engine

air compressor for brake operation on trucks and buses.

The Cummins diesel Model H has a 4⅞-inch bore and 6-inch stroke. The crankshaft is supported by seven interchangeable main bearings in the 6-cylinder machine and by five bearings in the 4-cylinder engine. It is equipped with a lubricating oil pump, a centrifugal type water pump and the fuel pump and governor are built as a single unit.

A Trailer Type Spreader

A NEW trailer type spreader which is of interest to municipal street departments for handling chloride for dust prevention or for spreading salt, sand or cinders or chloride on icy streets or may be used by contractors for spreading chips, slag or other covering on penetrated stone has been announced by the Ditwiler Mfg. Co., Galion, Ohio. Its distinct difference from other spreaders is that it is operated by its own air-cooled motor and the width of spread from 6 to 30 feet is regulated by the speed of the motor, making it always uniform regardless of the speed of the truck. It is quickly attached to any dump truck and is supported in part by the truck and in part by the rear wheel of the spreader which carries a standard automobile tire.

The Hercules-Ditwiler spreader is designed especially for use with lighter dump trucks but by a simple adjustment it can be used as readily with larger trucks. Agitator blades in the feed hopper give the material a rotary motion and break up any lumps which may have formed. An additional

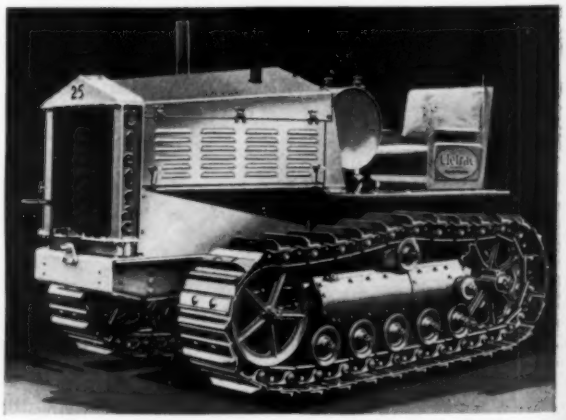
The Hercules-Ditwiler Spreader Attached to a Light Truck

hopper is supplied for use in spreading calcium chloride from non-dumping truck bodies. This spreader requires only a small permanent attachment on the trucks being used and it can be attached to each truck in turn in less than one minute. Adjustable legs are used to support the front of the spreader when it is detached from the truck. The spreader, including the engine and hopper, weighs 535 pounds. It trails back and manipulates readily at all truck speeds whether in operation or in moving from one place to another.

A New Model Crawler Tractor

A NEW medium-sized crawler tractor with a drawbar horsepower of 27 and a belt horsepower of 35, powered with a 6-cylinder 4-cycle water-cooled engine, has recently been announced by the Cleveland Tractor Co., 19321 Euclid Ave., Cleveland, Ohio. This new Model 25 Cletrac runs 1.95 miles per hour in low, 2.80 in intermediate, and 4.00 in high. The speed in reverse is 1.83 miles per hour at the governed engine speed of 1,250 rpm. The tractor has a planetary compensating differential, actuated by the engine, giving positive power on both tracks when turning. Pressure applied to the steering drum through the steering lever decreases the speed on one side, with proportionate speed increased on the other.

There are one upper and five lower plain bearing track wheel assemblies on each side, with continuous positive lubrication through felt wicking. The total tractive surface is 1,506 square inches. The general dimensions of the tractor are 105 inches long overall, 57⅜ inches wide and 55¼ inches high at the radiator cap. This tractor will turn in 8½ feet.



The New Model 25 Cletrac Crawler Tractor

A New Digging Bucket

THE new Kiesler Type N digging bucket which has a number of new features and is especially designed for digging blue clay, hard pan, deep dredging, excavating, handling large size compact crushed stone and general rehandling purposes has recently been announced by the Jos. F. Kiesler Co., 938 W. Huron St., Chicago, Ill. Kiesler buckets are made in eleven sizes, ranging in capacity from 1/10-cubic yard to 2 cubic yards.

Among the construction features of this improved Type N bucket are the new improved double lever arms attached to the top of both shells, allowing full down pressure digging action on both the shells and the cutting edges. The shells are also of new design, of one-piece flange steel plate, with no obstructions on the inside. The cutting edges are of heavy special alloy heat-treated steel. Full closing power is obtained with simple reeving of the cable, with no side leads or reverse bends.

The New Kiesler Type N Bucket

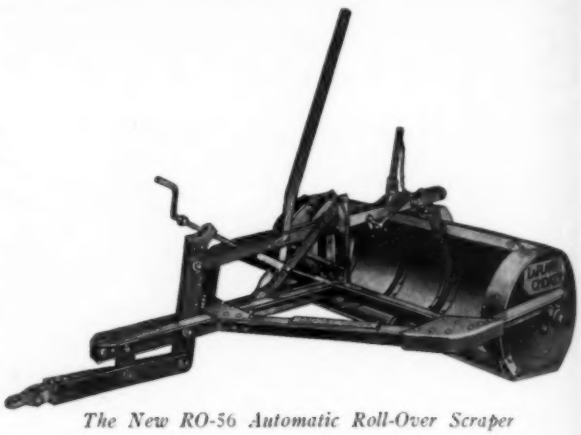
All sheaves and corner connection arms are fitted with renewable alloy heat-treated steel bushings. Lubrication is by the internal Alemite system. The teeth are also special alloy heat-treated steel, chisel pointed, and attached to the bucket with special non-turning countersunk bolts.

The manufacturer guarantees the performance and high quality of material used in every part of the Kiesler bucket, which is designed for accessibility, continuous service and long life.

A New Automatic Road Scraper

LA PLANT-CHOATE automatic roll-over scrapers are manufactured by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, under an exclusive license agreement with the Reynolds Estate and are built in six sizes, 18, 22, 27, 42, 50 and 56-cubic foot capacities for use with Caterpillar Fifteen, Twenty-Five, Thirty-Five, Fifty and Sixty-Five tractors respectively.

These one-man automatic scrapers have a simple tripping mechanism which allows the scraper to be tripped while going forward or backward. They are equipped with a self-cleaning



The New RO-56 Automatic Roll-Over Scraper

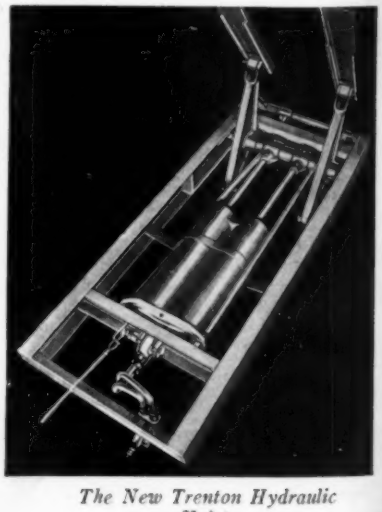
latch on the trip which automatically engages itself, permitting the loaded bowl to be slid backward any distance without revolving. By a single pull on the trip lever rope, this latch will disengage and permit the bowl to be rotated either backward or forward and dumped. When the load has been dumped, this same latch holds the bowl in the dumping position, thus permitting the bottom of the bowl to be used to bulldoze the pile of earth or to spread the earth in a layer.

All sizes of these scrapers are provided with a crank to adjust the cutting depth to meet the various soil conditions, as well as with an automatic pressure release which lifts the cutting edge out of the ground when the scraper is loaded. Only one operator is required to run both the tractor and scraper. LaPlant-Choate automatic roll-over scrapers are particularly adaptable for use in the construction of drainage ditches, excavations, bank widening, cleaning water ways, leveling, short hauls and other dirt moving jobs.

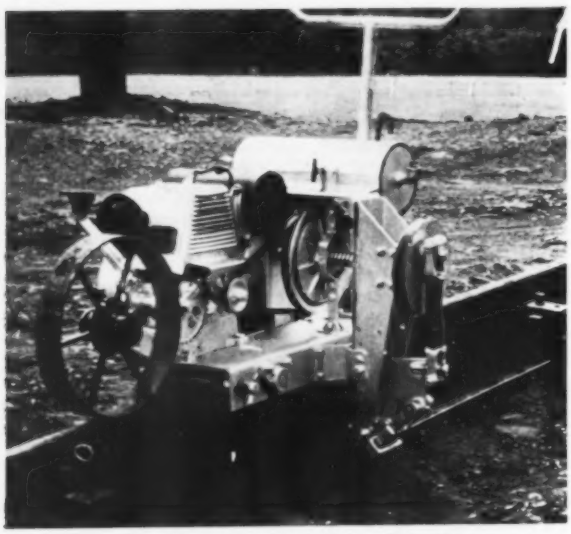
A New Hydraulic Body Hoist

THE new Trenton hydraulic body hoist, recently announced by Fitz Gibbon & Crisp, Inc., Trenton, N. J., is a complete, self-contained compact unit with high angle lift and quick action. Its design permits the use of an abundance of power without subjecting either the chassis or hoist to undue strain and the load is evenly distributed over a large chassis area.

This hoist is built in two single-cylinder and two twin-cylinder models to cover all load and dumping conditions. All Models are complete units, including cylinders, pump, lifting arms, hinges, drive, power take-off with control, clamp and wood sills. Mounting requires no drilling of holes or other fitting, it being merely necessary to clamp the hoist unit to the chassis.



The New Trenton Hydraulic Hoist



The New Lakewood Form Tamper

New Machine Insures Better Tamped Forms

A MECHANICAL tool developed to take care of the tamping required under steel road forms was exhibited for the first time at the Detroit Road Show by the Lakewood Engineering Co., Columbus, Ohio. This Lakewood form tamper does the work with a saving in labor and provides better tamping. It is a small easily portable unit that can be handled by one man and will run on the forms, once it has been placed there, without attention and until stopped. It also oils the inside face of the forms. This form tamper is adjustable as to base and height of forms and is provided with tampers operating on both sides of the form at the base.

Air Filters for Compressed Air Equipment

AIR tools and the requisite air power plant play an important part on any construction job. They are usually the first pieces of equipment to go on the job and in the interest of efficiency and economy it is advisable to take the proper care of this equipment, to insure a long life of service. The Coppus Engineering Corp., Worcester, Mass., has developed Annis air filters which are particularly designed to increase the efficiency of air tools and compressors.

These filters are of the dry type made in multiples of 100-cfm capacity, the filter medium consisting of special high grade wool felt elements supported on rustproof welded wire spacer frames. The units are mounted on a base fitted with a pipe flange for connection to the compressor intake. All the elements are enclosed by rustproof metal louvered housing covers, making them suitable for outdoor erection without additional protection. These filters require no accessory equipment for periodic cleaning and regeneration. They can be cleaned in place by blowing off with an air hose and without taking them out of service.

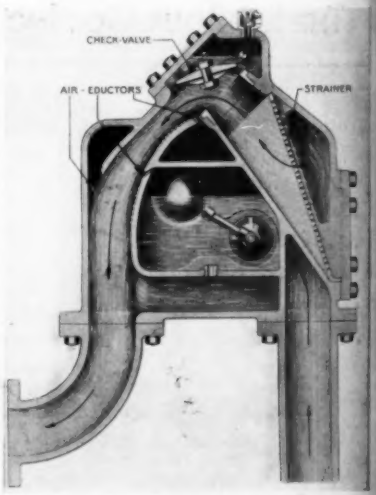
The compressed air equipment in use in the construction of Hoover Dam is equipped with Annis air filters.

Annis Air Filters for Compressors at Hoover Dam

Suction-Line Primers for Centrifugal Pumps

A SUCTION-LINE primer which exhausts the air from the suction line and fills it with water, strains the water and keeps large particles from getting into the centrifugal pump has been announced by Barrett, Haentjens & Co., Hazleton, Pa. The operation of the Hazleton suction-line primer is simple and prompt. It does not reduce the efficiency of the centrifugal pump to which it is attached and the loss caused by friction through the primer is only slightly greater than the loss through a standard strainer and check valve. It can be applied to any moderate sized suction-lift centrifugal pump whether its operation is controlled automatically or manually.

The pump and primer must be filled with water before the initial start. This is done through a suitable opening in the discharge line. The pump is then started and draws water from the central chamber, creating a vacuum which causes air from the suction line to rush through the check valve into the chamber. When the chamber is pumped empty, the float falls and tilts a mercoid switch whereupon the pump stops. The water then rushes back from the discharge line, refills the chamber and pushes the air trapped by the closing of the valve into the discharge line. When the chamber is completely refilled the float rises, tilts the switch and again starts the motor. Every short run of the pump removes from the suction line an amount of air, equivalent to the contents of the entrance chamber, the falling and rising level performing the same function as the piston of an air pump.



The Hazleton Suction-Line Primer

When water from the suction line enters the chamber, continuous flow commences. Eductors then rid the chamber of air. When the pump is stopped, the check valve closes and prevents the draining of the suction line. The check valve being located at the high point and being mounted on an angle is not likely to leak and since all of the stuffing boxes are under pressure, air cannot enter the suction line. The pump, therefore, remains primed and pumping will commence immediately when the starting switch closes.

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